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Notes and Comments

The Society of Dyers and Colourists

THE Society of Dyers and Colourists, whose jubilee celebrations in Yorkshire we reported last week, came into existence early in 1884 through the recognition by far-seeing dyers in West Yorkshire of the "absolute needs of the times" for an organisation in the dyeing trade "to watch over the progress of textile colouring abroad and to promote and encourage the science of dyeing." Its agreed objects, "the promotion of scientific and technical knowledge among textile colourists and the general advancement of the interests of the tinctorial and allied industries, excluding all questions connected with wages and trade regulations," have remained unchanged throughout the half century which has elapsed since they were first drafted, and they have continued throughout that time to attract members from all parts of the industrial north and a number from the Midlands, the west of England, London and Scotland. The story of the progress of the Society in particular and of dyeing in general, is exceptionally well told in the special Jubilee issue of the Society's Journal.

A few of the founders are still living, but of necessity their work has been handed on to others and with it the spirit which led to the formation of the Society. The membership roll contains many distinguished names and is truly international in character, and the Society's publications are read throughout the world. The Society, as Mr. G. G. Hopkinson, the hon. secretary, points out in the Journal, has never possessed more than a paltry few hundred pounds and has frequently been faced with the likelihood of incurring heavy liabilities before it could see many of its ideas brought to fruition. Yet when it realised the need for a volume of the type of the "Colour Index" costing upwards of £9,000, and again when it was deemed essential to carry out prolonged researches into methods for the standardisation of fastness tests at a further cost to the Society of £5,000, it was soon found that it would be able to face the costs with equanimity as a result of the friendship and appreciation of firms and individuals in the industry. Never has the Society wanted for funds or for men.

Unification or Independence ?

IT is impossible to look into the history of such a body as the Society of Dyers and Colourists without reflecting upon the persistent way in which the unification of chemical and allied societies has been discussed for more than a generation. Immediately the Society of Dyers and Colourists was born, the Society of Chemical Industry, at that time barely three years old, urged the younger body to throw in its lot with the older; indeed the Socity of Chemical Industry had already endeavoured to "cover" the activities of the dyeing trade by the publication of a few papers on dyeing. To-day the Society of Chemical Industry is still pursuing a similar policy, seeking to prevent further multiplication of organisations and to take under its parental wing the care of local sections and subject groups. We do not suggest that this policy is not all to the good, but it cannot be denied that if it had succeeded fifty years ago in the case of the dyers and colourists the realm of chemical activity would have been the poorer to-day to the extent of a Society the inauguration of which marked an era in the history of dyeing.

From investigations into the nature of the task which the founders of the Society of Dyers and Colourists set themselves, one finds that, despite the friendship of members of the Society of Chemical Industry, at that time they were taunted by those members of that Society who visualised something of the stupendous task in front of the men who were seeking to create a sister Society in 1884. The taunt was in the form of a prophecy that the proposed Society of Dyers and Colourists, with its ambitious programme before it, could last probably only a few months, but certainly not more than a few years. This incited the founders to still greater action. It became a healthy challenge. Since then great discoveries, some of them the greatest the world has yet known, have figured in the Society's history.

Salt Imports

IT is disappointing to record any set-back to this policy. The group of manufacturers comprising the Salt Manufacturers' Association partially disrupted in December and efforts so far made have failed to heal the breach. The position in the salt trade appears to be that although representations supported by the Association of British Chemical Manufacturers have been made to the Import Duties Advisory Committee for an increased tariff on imported salt, the increase has not been granted. Yet vacuum salt is being dumped into this country by a Dutch firm using the home advantage of a heavily protected local market to reduce its export prices. We have previously commented upon the unfairness of this type of competition; it can only be met by Government action, and Govern-

ment action can only be induced by representations from a united industry. Moreover, the Dutch producer mentioned admits that he sells in England at a loss in order to force us to give up to him a large share of our foreign markets. The result is uneconomically low prices for English-produced salt.

It is therefore particularly unfortunate that the Salt Manufacturers' Association is now reduced to seven members, three having retired. We do not profess to know what has inspired the partial break-up of the Association, but it seems singularly unfortunate that two sections of British trade should be fighting each other at a time when both of them are having to meet a severe and apparently singularly ruthless type of foreign competition. Mr. F. W. Clark, chairman of the Salt Union, recognised this in his annual address to the shareholders. He stated that if a suitable arrangement whereby the Association closes its ranks is not reached this year, the outlook is not at all promising and the directors of the concern cannot hope for a favourable year in 1934.

Planning Ahead

NONE of our readers can have been oblivious to the great effort that is now being made to replace oil by coal. Propaganda based on every argument that the wit of man can discover is being used by those whose interests lie in the coal fields, to drive imported oil from our shores. Nothing is left undone; an organisation has been created specially for the purpose; advertising and personal propaganda are costing large sums. Not the least of the efforts that are being made is that directed to the replacement of oil by coal in shipping. All this vast effort is considered well spent if it succeeds in increasing the coal sold by the collieries by a million or so tons per annum—an increased output of but 1 per cent.!

But there is another side to the picture: let us quote a responsible opinion. "If mineral oils can be employed for steam raising in ships there is no doubt that there are a vast number of reasons in favour of the adoption. Two-thirds of the stowage space now taken up by fuel can be made available for carrying cargo. The increased cargo-carrying capacity causes such a diminution in the cost of running a steamer as to leave a large margin for profits. One iron-clad can carry only three or four days' provision of coal, and ten days' provision of fuel severely taxes the capacity of our most accommodating men-of-war, so the prominent merit we have specified of this new project cannot be over-rated. Cleanliness of combustion is a second feature. . . The public will have a great deal to gain by it, for smoke, ashes and dirt necessarily produced by the use of coals will be no longer causes of annoyance and complaint." That is not, as might be supposed, propaganda put out by an oil company.

Need for Long Vision

NO doubt the occurrence of certain words will have given the date away to our more observant readers. Actually the quotation (slightly modified in wording to admit of compression, but identical in sense) occurs as a serious contribution to a well-known *colliery* paper on February 2, 1867. The coal-owners themselves must have advocated the use of oil for many purposes because of the "vast number of reasons in favour of its adoption," since no word of disagreement or even of mild protest appears in subsequent issues of the paper. It may be difficult for the colliery interests to argue that what was so demonstrably right in 1867 is obviously reprehensible technically in 1934. It is clear that in the intervening years they have uncomplainingly allowed oil to capture many of their markets, almost without a fight. If the industry had been united and if there had been intelligent planning ahead the present state of affairs would never have arisen.

It is necessary to plan far ahead to-day. Every movement that might be advantageous or antagonistic must be watched minutely and must be countered or assisted as seems advisable. A year ago we published a definition of the qualifications of the head of a research laboratory, one of which demanded that he must be able to see ten years ahead. That is surely an urgent need of our nation to-day. Industry is full of men who can do their day's work with a fair measure of success and with reasonable efficiency. We have few who can be trusted to read the signs and to plan intelligently ahead so that mistakes shall not be made in policy to-day that will be prolific of difficulties in the years that lie before us. The coal industry was perhaps singularly short-sighted. In the same year (1867) and in the same paper, they were warned that coal could not remain king for ever and the future of fuel lay in the use of oil. Even if the warning had been heeded the coal mining industry was too disunited ever to do anything. It has taken years to begin to weld the coal owners into a body capable of pursuing a coherent policy.

The Control of Industry

TO-DAY there are signs that we are moving in the direction of co-operation to weld together the constituent firms in each industry. It is only by co-operation that the policy laid down can be effectively pursued; but, to go back to fundamentals, it is only by painstaking research—not only scientific, but historical and economic—that the knowledge necessary for taking correct decisions can be acquired. When all that has been done, it yet remains to find the leader who shall be capable of interpreting correctly the signs of the times of initiating and directing policy. This is necessary not only in the whole industry, but also in each individual firm. The penalities attaching to neglect of these essentials in the control of industry are sufficiently obvious from the experience of the coal industry to serve as a warning to others.

These reflections, which have arisen from the perusal of documents already ancient as industrial history, are given point by the concluding remark of the address of the President of the Federation of British Industries (1934). "It is important that industry should be united and strengthened both to defend its claims and to voice the views of industry" will become increasingly important. Planning based on vision and knowledge, coupled with organisation to make those plans effective, is the fundamental necessity of the future. Trade organisation and similar representative bodies must be strengthened and supported.

The Rehabilitation of Natural Resins

Dr. Krumbhaar Speaks Hopefully of the Future

THOSE in close touch with the varnish industry could see clearly that there was a movement under way, more actively in some countries than in others, to go back to the use of natural resins, especially of the old fossil copal gums, said Dr. W. Krumbhaar when reading a paper before the Oil and Colour Chemists' Association, in London, on May 24. Some years ago, exaggerated hopes had been reposed in the new synthetic materials, in the erroneous belief that certain outstanding properties would make the synthetic resins generally applicable to every possible purpose. But reaction was bound to come, and it had come very soon. There is once again a clear understanding that varnish making is a matter of compromise, *i.e.*, of striking a balance between the merits and the shortcomings of the various materials, and that in the resin field there is ample room for both products, the synthetic resins and the natural gums.

One good result had come from the synthetic resin deluge of the past years. It had shown that synthetic resins had cerain inherent qualities which were not found in the natural products as such and it had spurred technologists to seek means of refining and treating the natural resins so as to impart to them similar properties. Indeed, the field of natural gums was almost wholly neglected for a long period. A rehabilitation of the natural resins was possible only by modifying and improving their properties. This was done mainly by processes involving sifting, grading, cleaning, melting, neutralising and bleaching. In practice, these processes were partly or wholly applied to rosin, fossil copals, damar, soft copal gums, and shellac. A discussion of the processing methods to be applied to the different resins, and of the new and valuable properties thus obtained, would show that a rehabilitation of natural gums was fully justified.

The Hardening of Colophony

Colophony, because of its low cost and availability, had never gone out of use to any considerable extent; but there had recently been noteworthy improvements in processing this material. The usual method of hardening rosin by adding metal compounds at temperatures between 400° and 500° F. had been much improved, resulting in lighter and more neutral products, by introducing the metal oxides or hydroxides in the finest possible state of subdivision, thereby greatly facilitating the reaction. The old art of hardening colophony by heating the rosin with lime up to temperatures exceeding 400° F. had been considerably improved by the modern method of treating the rosin in solution. The oxides and hydroxides of calcium, zinc, lead, etc., reacted rapidly and completely with abietic acid at the low temperature of 220° F., when the colophony was dissolved in mineral spirits or other suitable solvents. Because of this very moderate temperature of 220° F. which is used in making solutions of limed rosin, the colour of the products was remarkably lighter than that of hot processed resins, in the manufacture of which the temperature usually must be raised to about 500° F. The reaction could be facilitated still further by treating solutions, not of straight rosin, but of mixtures of colophony with other suitable organic acids, especially resinous or fatty acids. Experience had shown that mixtures of different acids dissolved the metal oxides better than did the straight unmixed acids. The reaction could also be promoted by taking care that the liberated water could evaporate easily and completely. Of course, as soon as the reaction was completed, the solution could be filtrated and the solvent distilled off under ordinary pressure or by vacuum, in order to isolate the resinate.

Reactivity of Rosin Solutions

The high reactivity of rosin solutions led to the idea that the resinous balsam, freshly obtained as it flowed from the tree, would be useful as such in varnish manufacture. Indeed, considering the making of rosin varnishes, it did not seem very sensible practice first to distil off from the balsam the turpentine and then later to put it back into the rosin in thinning the varnish. In this case, turpentine distillation and subsequent thinning was nothing else than a complicating detour which increased the cost and darkened the colour. In general, the turpentine content of the resinous balsam varied between 12 and 22 per cent.; the best balsams contained up to 25 per cent. of turpentine, and were gathered according to methods recently developed by scientific forestry. Extremely light varnishes could be made from these balsams according to the method of hardening in solution; but several difficulties remained, especially that of the crystallising tendency of abietic acid. Of course, this tendency was reduced on incorporation with the materials ordinarily used in varnish manufacture, such as stand oils or synthetic resins of the flexible type.

The old hot melting method of making the usual varnish driers could be replaced successfully by low-temperature solution methods. This was being done already on a large scale, and it was obvious that the cheap ordinary colophony occupied an important place among the acids used for dissolving the metal oxides for preparing driers. Abietic acid, in fact, was superior to many artificially prepared organic acids described in a number of patents, for the simple reason that abietic acid was cheap and perfectly odourless in the dried film.

Improvements in Gum Ester

Ordinary rosin had also gained so much ground in the paint and varnish industry because of improvements in the esterification of rosin with glycerine. Good quality ester gum occupied a universal position in the varnish industry, surpassing all other resins; it should not be considered a competitor of synthetic resins, but is rather a desirable material to cheapen and extend synthetic products, at the same time imparting to them valuable technical properties, for example, gloss, solubility, etc. Improvements in the quality of ester gum, *i.e.*, lighter colour, lower acid number, higher melting point, had been achieved mainly by refinements in apparatus, which permitted control of the process down to every detail. As to the acceleration of the esterifying process, small amounts of boric acid catalytically facilitated the reaction; but this catalyst caused a dark greenish discoloration. Some acids of high molecular weight, formed in the production of phenolic resins, had a similar effect with a like darkening, but this could be diminished by adding a fraction of a per cent. of an inorganic acid. Recently non-volatile aliphatic acids, containing hydroxy groups, had been recommended as positive, non-darkening catalysts, *e.g.*, lactic acid, of which 1 per cent. was said to have a distinct effect.

Real importance might be attributed to the methods of processing normal ester gum in order to increase melting point, viscosity and reactivity with oils. This was done by treatment with polybasic carboxylic acids, with formaldehyde polymers or with phenol-formaldehyde condensation products, etc. All these methods led finally to synthetic resins. Among these procedures the treatment of ester with a straight phenol-formaldehyde condensation product had been taken into consideration by many varnish men. The reaction was effected by carefully heating the materials together at approximately 500° C. Even as little as 20 per cent. of a pure phenolic condensation product would suffice to raise the melting point of ester gum as much as 40° F., and would increase its viscosity considerably; but the process was better carried out by the manufacturer of synthetic resins, inasmuch as the products were more uniform, more soluble and lighter in colour.

Newer Refining Methods

In addition to hardening and esterification, there were several other methods for processing and refining gum and wood rosin. With the aid of a high vacuum in suitable apparatus, rosin could be distilled in a very low temperature and chemically pure abietic acid could be obtained as a distillate. The refining of rosin by treatment with resorcinol, furfural, aniline, chlorhydrine and other substances had been

suggested. Another method of modification of rosin consisted in treatment with boron fluoride, the resulting rosin product having a higher melting point and no longer giving the typical violet colouration in the Liebermann-Storch rosin test. Again, it was possible to improve the qualities of rosin in other respects. Abietic acid had two conjugated double bonds; this unsaturation was the chief reason why straight rosin varnishes had poor durability, because the double bonds were prone to rapid oxidation. One means of destroying the unsaturated nature of rosin was by reacting with aromatic halogen derivatives; another was hydrogenation, which appeared to be promising. Hydrogenated rosin of light colour and very good colour retention had been made.

Hard Copals

The purifying of hard copals had been tried by means of pulverising and dissolving in a solvent filtering off the impurities and distilling off the volatile solvent, but there were very few solvents available for the purpose. On the other hand, treatment with solvents was important for those hard fossil gums which were not to be melted but were cold cut, the solutions being intended for use as clear or pigmented finishes on metals. Such solutions could be made with the usual solvents and in the usual concentrations by rendering the hard copal, *e.g.*, Congo copal, soluble by hot masticating. This process was based on the peculiar fact, comparatively little known, that finely powdered hard copal, when masticated on hot roller mills, increased its solubility considerably. The basic idea of the process was capable of various modifications, *e.g.*, the mastication might be effected together with other resins, in combination with oils, in presence of solvents under a reflux condenser, etc. Mastication also rendered the copal more easily fusible, so that this method of mechanical molecular degradation might be helpful in copal processing. It was difficult, however, to decompose the molecule so far that the gum became soluble in linseed oil or in tung oil. To make it soluble in oil it was necessary in many cases to run the fossil gum at high temperature, *i.e.*, to subject it to destructive distillation at about 650° F.

There was another refining method in which solvents were used, applied for kauri copal. In this process the kauri was melted in the usual way and the melt was dissolved in a mixture of benzol-alcohol. When the solution was diluted with water, two layers were formed, the benzol layer containing the major part of the kauri. By suitable variation of temperature and concentration conditions, and by proper variations of the solvents used, the colouring matter of the kauri could be made to separate into the aqueous layer and a comparatively light coloured kauri was obtained in the benzol layer, from which it could easily be isolated.

Perfecting the Old Melting Procedure

A real rehabilitation of the fossil gums had been made possible only by perfecting the old melting procedure, the running process. The old process involved severe over-heating. In plant practice, over-heating was best prevented by melting the copal in bulk, in batches of several thousand pounds each. This was possible in apparatus of special construction in which the ratio between the heating surface and the total amount of copal was designed for the optimum of heat transfer. The salient point of the correctly and properly handled gum running process was to decompose the material just as far as was absolutely necessary to render the copal soluble in linseed oil and mineral spirits, thus avoiding unnecessary deterioration of physical properties and causing the least possible chemical attack on the dibasic acids which became monobsic by prolonged heating.

The dibasic acids, present in all fossil copals, had special value in varnish making. When heated with glycerine and monobasic acids, as, for instance, fatty or some resinous acids or the glycerides of such acids, they yielded condensation products of very high molecular weight which imparted extraordinary gloss and flow, good drying characteristics and high durability to the varnish film. Modern varnish chemistry made use of this valuable phenomenon by the resins with phthalic anhydride as a base. After running, the copal gums were usually combined with the oil; but in order really to develop their valuable properties they should be subjected to a chemical processing by neutralising the free acids which were still present, the simplest method being treatment with basic metal compounds, especially calcium hydroxide or manganese hydroxide. Small percentages of such compounds were readily taken up and had a favourable influence on gloss, drying and compatibility with pigments. Moreover, the tendency of blooming was greatly reduced by these hydroxides, in most cases the addition of half per cent. being sufficient to prevent any blooming of the finished varnish.

Solubility in Mineral Spirits

Dealing with some of the reasons why a properly melted, neutralised and purified fossil copal might be regarded to-day as fully rehabilitated in comparison with synthetic resins, Dr. Krumbhaar said that the solubility in mineral spirits was remarkably high even after much dilution. Hence, there were no gelatinous or granular precipitates such as were sometimes observed if synthetic resin solutions were diluted beyond a certain ratio; neither was the copal ester oxidised in the solution, in contrast to some synthetic resins, which might become insoluble by oxidation. Esterified copals yielded varnishes that were completely miscible with pigments. These varnishes were especially fit for coating the inside of food containers, because after high baking they did not impart either taste or odour to the contents of the cans —unlike many synthetic, especially phenolic resins.

Damar had maintained its important position on account of the fact that, if used as an ingredient in nitrocellulose lacquers, it showed unique characteristics by imparting to the lacquer unusual pale colour, outstanding colour retention, gloss, pigment compatibility, adhesion and durability. The damar had to be adapted for the use in lacquers by removing the alcohol and ester-insoluble β-damaroresene. By the usual method, the damar was dissolved in toluol and the solution diluted with alcohol, whereby the insoluble parts separated as a slimy precipitate. Instead of adding the alcohol to the toluol solution, however, it was much better to dissolve the damar in the mixture of toluol-alcohol, the ratio of which was found empirically, by heating and boiling the pulverised damar with the solvents under a reflux condenser. On cooling, the insoluble portion was precipitated,

Removing Mechanical Impurities from Copal

In using soft Manila for various purposes there was a definite need for a method to free the copal from all mechanical impurities, sometimes amounting to more than 10 per cent., without the necessity for using large amounts of alcohol. In a new process this was done by heating the powdered copal with 10 per cent. of its weight of butanol under a reflux condenser till the powder was completely swollen and a homogeneous mass was formed. The butanol was then carefully distilled off and the temperature was raised nearly to 400° F. By the distillation, part of the terpene derivatives were also driven off and the residue was a liquid resin, which could readily be filtered while hot.

Shellac had lost much ground in the varnish industry, and even more in electrical insulation, in spite of the fact that it was superior in arc resistance to phenolic resins, and much had been done for the the rehabilitation of shellac by the successful work of the Lac Research Institute in India, and the extension of that Institute in the Paint Research Station at Teddington, under Dr. Jordan and in collaboration with Mr. A. J. Gibson. One way of converting shellac into a resinous compound that could be used in regular varnishes would probably consist in decomposing and simplifying the shellac molecule, first by treatment with chlorine or other strong chemicals, and then combining the resulting material with resinous or fatty acids.

Points from the Discussion

Dr. L. A. JORDAN (director, Research Association of British Paint, Colour and Varnish Manufacturers) said that Dr. Krumbhaar has embellished his statement with a considerable number of suggestions as to how to set about this job of rehabilitating the natural resins. Hydrogenation was mentioned, and one can accept the argument that a fully substituted resin molecule was certain to be more durable to a light and probably would give rise to quite durable films; a good deal of work had been done in this direction and the Hercules Co. had made ethyl and methyl esters of hydrogenated resin

products which had found considerable use as plasticisers; again the fully saturated molecule gave material which was comparatively insensitive to light and produced reasonably durable films. Dr. Krumbhaar had not mentioned the hydro-terpenes and Dr. Jordan invited him to say what they were, that is, what hydro-terpenes they contained in addition to the hydro-naphthalene products which formed their basis.

Hydro-Terpene

Dr. KRUMBHAAR, referring to hydro-terpene, said it was made in Germany by the German hydrogeneration works, which concern had developed the products decaline and tetraline, which were hydrogenated naphthols. The use of tetraline had been abandoned in the German varnish industry, one reason being its penetrating odour, and another that when used in white enamels it gave a distinctly reddish tone to the dry film. Decaline, on the other hand, which was the fully hydrogenated naphthalene, had a boiling point very similar to that of turpentine, it had a pleasant odour and practically the same solvent power. Hydro-terpene, another hydrogenated product, had almost the same properties as turpentine, and was cheaper; it had not to bear the hydrocarbon taxes, which in some cases amounted to more than the values of the materials taxed. Another interesting product was a hydrogenated mineral spirit, named Hydrosol; its solvent power was almost the same as that of toluol or the coal tar solvents, and the odour was not so objectionable as that of coal tar solvents.

Mr. W. GARVIE, discussing the electrostatic method of cleaning natural resins, said he believed that about the year 1920 a company was formed for extracting the impurities from natural resins by that means. A plant in New Zealand, for Kauri, had proved a failure, but, as one who had had a good deal to do with this matter privately, he believed there were enormous possibilities along those lines. Not only could impurities such as sand, woody fibre and various debris be taken out, but the resin itself could be graded, *i.e.*, duff coloured particles could be separated from light coloured particles. He had tried, without success, to persuade the electrical interests in this country to conduct research; but the method was fundamentally of the greatest interest. A good deal of work had been done in the direction of modifying shellac chemically, but a great drawback was that most of the attempts made in that direction had rendered the resulting product almost jet black. It could be heated at a temperature of 150° C. almost indefinitely, and would still retain its viscosity. It was also known that sulphur had a marked effect on the properties of shellac, and it increased the tensile strength and hardness.

Dr. J. O. CUTTER (Research Association of British Paint, Colour and Varnish Manufacturers) said he was particularly interested in the mixed esters produced from mixed oils and mixed oils and gum resin acids. The subject had received considerable attention in this country, both scientifically and technically, and he believed that at least one process for the production of the gum resin-oil mixed ester had been protected. The products were of considerable value, and once the mechanism of the formation of mixed esters was thoroughly understood it was likely to receive further attention. In the manufacture of varnishes it was the chemical compound which was desired, since this gave the satisfactory durability. Mixed ester oils were available in this country, and undoubtedly they would receive attention from all varnish manufacturers.

Letters to the Editor

The Editor welcomes expressions of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

Scientific Research in Soviet Russia

SIR,—Political, moral, or religious opinions cannot alter the fact that Russia has embarked upon a scheme of intensive industrialisation. A premium has thus been placed on applied science, biology and chemistry in particular, and experimental institutes have been formed all over the Soviet Union with headquarters at Leningrad. It is of interest to note, in passing, that the Russian Academy of Sciences, often considered to be quite new and a product of the Revolution, was founded as long ago as 1720, by Peter the Great —but the Academy practically died with him.

Research work of purely theoretical interest is by no means stifled in the laboratories of Russia, but the potentialities of the country are so fully realised that the main desire is to speed up production. Science is considered as the only means by which this can be done especially as imports are severely restricted. The output per man, at present very low, and not of outstanding quality, must be improved so that the motto over Moscow University " Science—for the Toilers " well expresses the aim of those in power.

We all know that Russia is a country of " plans " and science plays a large part in each of them. It is recognised that phenomena—biological, chemical and physical—have to be brought under control and that no amount of theorising will do this. Hence the few records that are published of scientific research are very largely utilitarian in purpose.

Agriculture, in a country extending from the Arctic to the sub-tropics, offers the widest possible field for research in biology and chemistry. During the last two years, work has been published with a direct bearing on control of forest pests; cotton and its resistivity to cold; flax and methods for improving its fibre; rubber production using seeds that have been subjected to ultra-violet rays; rice-sowing by aeroplane; and the effects of daylight on plants. In connection with the last item, the potato has received special attention for it has been found that too much daylight prevents tuber formation. Artificial manures, chiefly nitrates and phosphates, have been studied and the conditions for their most profitable absorption; while fixation of nitrogen by enzymes has been studied, using extracts from azotobacter, at pressures up to three hundred atmospheres.

The artificial ripening of various fruits by use of the vapours from organic liquids such as ethyl alcohol, and by ethylene, is being studied so that shortness of season shall be no deterrent to fruit growing. A greater efficiency is also being sought in the synthesis of aromatic aldehydes such as vanillin and heliotropin. Carotine has been studied in connection with the healing of wounds and to prevent avitaminosis.

In metallurgy much is being attempted for it is in this branch of industry that Russia is far behind the countries of the West. Raw materials are to hand in almost unlimited amount and variety so that proficiency means a great deal to the country. Alloys of all kinds are now made and special mention has recently appeared in research items from Leningrad of acid-resisting alloys; and alloys that will not corrode in contact with raw oil from the well, during transit to other countries. One method that is being investigated is the use of sodium chloride-silicate coatings in the tanks.

The insistence on practical applications of the work done in the " Institutes " is not always free from humour. Julian Huxley, in his book " A Scientist among the Soviets," mentions the story of Zavadovsky, of Moscow, who considerably advanced our knowledge of the ductless glands by his experiments with thyroid extract on birds. Having found that certain doses of thyroid produced moulting in the birds, he had assigned to him a flock of one hundred geese on which to experiment to see whether the feather bed industry could not be benefited by causing geese to moult four times a year. —Yours faithfully,

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Research on Non-Ferrous Metals

Progress of the British Non-Ferrous Metals Research Association

THE fourteenth annual report of the British Non-Ferrous Metals Research Association was presented at the general meeting of the Association on May 31.

The Association has been strengthened in membership during the year by the admission of two of the most important of Northern Rhodesian copper producing companies. This, together with the accession of British Copper Refiners and the Copper Development Association, has made still more complete the representation of British copper interests both on the producing and manufacturing sides. A satisfactory agreement has also been made for admission, on a membership basis, of the International Tin Research and Development Council.

Referring to the Conference of Research Associations recently called by the Department of Scientific and Industrial Research at which a substantial offer of increased Government support was made to the research associations, provided industrial contributions from member firms were correspondingly increased, the report states "the occasion is clearly opportune for a forward move by the Association with the assurance that an extension of activity will secure a substantial backing from the Department for at least several years to come. The Council is giving most careful consideration to the way in which the opportunity can be used to the best advantage."

Increasing Interest in Research

Researches in progress during the year totalled 15, and the expenditure was nearly £22,000. Some indication of the steadily increasing interest taken by members in the work of the Association is shown by the fact that the number of major technical inquiries from member firms during the year was 410 compared with 276 similar inquiries in 1932 and 219 in 1931. Reviewing the research work carried out, the report states that considerable progress has been made with the study of the effects of impurities on the mechanical and rolling properties of various non-ferrous metals and the influence of varying amounts of different impurities on the quality of the finished product. A thorough survey of the possibility of eliminating bismuth from copper in fire-refining will be put in hand during the year. The latest optical methods are being employed for determining the amount of impurities, especially those of sodium and tellurium, in lead and its alloys. The results of methods for estimating minor constituents in zinc, tin and copper have been published, while similar work on aluminium is in its final stage.

In view of the increased use of electro-plated goods in the home and in industry, it is interesting to note that as a result of researches on the electro-plating of nickel, copper and chromium, methods have been developed for preventing the porosity which leads in time to the formation of unsightly spots of corrosion, and for obtaining a better adhesion of the deposits. Work on the electro-deposition of tin has shown that sound tin deposits of any desired thickness can be produced; coatings as thin as 1/2,000 of an inch in thickness on steel have been found to be substantially free from pores.

Soundness of Aluminium Castings

An improvement in the soundness of aluminum pistons and crank cases for aircraft and for high speed motor cars and a reduction in the number of works "rejects" has been found possible as a result of a very simple method for the removal of dissolved gases in aluminium during casting which has been developed by the Association. The method is one which can be applied in the foundry to any aluminium alloy. Provisional patent protection has been obtained for the method and large-scale tests on melts up to 600 lb. have been made with the process in members' foundries. The cost of the treatment is estimated to be less than one-tenth of a penny per lb. of metal.

The new lead alloys originally introduced for cable-sheathing, but which are also proving suitable for domestic water pipes, are attracting a good deal of attention abroad. The report records that negotiations have been successfully concluded for the issue of licences for working the Association patents for these alloys in France, Spain and Italy, and in the United States. Negotiations for licences in other foreign countries are also in progress.

Tarnish on Bright Metals

The increased use of bright metal in shops, public buildings and for many household fittings has led the Association to study the effect of tarnish on the polished surfaces of various materials. The scope of the research has covered not only liability of various materials to tarnish, but has included a determination of the effects of various methods of removing tarnish together with the effects of cleaning treatment upon the subsequent rate of tarnishing.

The report states that in the past many of the most important investigations carried out on behalf of the Association have been conducted in the laboratories of the National Physical Laboratory, the Research Department at Woolwich, or at universities. The conclusion has now been reached, however, that a better balanced team of research workers could be secured by concentrating much of this extra mural work in the Association's own laboratories in London and this is now being done. Where special equipment and experience is demanded the Association will still turn for help to the great metallurgical laboratories elsewhere.

Mr. T. Bolton, the chairman, referred to the increased use which members are making of the Association, thanks in part to the fact that they now had their own headquarters. Financially they were holding their own; manufacturers were not supporting them as they might, but that was due to the bad times and the fact that an appeal was made to them for subscriptions only a year ago. The Association might usefully spend more than it was at present doing, especially as the Government through the Department of Scientific and Industrial Research, had promised to give increased support to research associations if contributions from firms in membership were correspondingly increased. The Council was considering how best to take advantage of this opportunity.

Sir William Larke, director of the National Federation of Iron and Steel Manufacturers, speaking as a friendly visitor from a kindred industry, encouraged his hosts to spend more on research. His own industry, having spent only a few thousands on research, had saved themselves £1,750,000 a year in fuel alone as a result. The sales of the non-ferrous metal industry amounted to about £50,000,000 a year, yet they were spending only a trifle over £22,000 on research. No individual firm should rely on its own research department; by assisting a general solution they were contributing to the use of their materials and the reduction of unemployment.

United States Mercury Industry

Statistical Summary for 1933

FIGURES covering mercury output in the United States in 1933 indicate that 9,402 flasks, with a calculated value of $556,852, were produced. These figures represent decreases of 26 per cent. in quantity and 24 per cent. in value, from the 12,622 flasks, with a calculated value of $731,129, produced in 1932. The average price for the year was $59.227 a flask, compared with $57.927 a flask in 1932. As usual, the output of California, 3,663 flasks from 31 mines, was the largest reported for any State. The 1932 production of 5,172 flasks for that State was made by 63 mines. Imports (general) of mercury in 1933 were 22,555 flasks, compared with 8,114 flasks in 1932 and 356 flasks in 1931. Of the total imports in 1933, 17,007 flasks were credited to Spain, 3,212 flasks to Italy, and the remainder to Mexico and the United Kingdom. Imports for consumption were 20,315. Stocks of mercury in bonded warehouse increased from 3,840 flasks at the end of 1932, to 5,370 flasks at the end of 1933.

Castor Oil as Raw Material for Plasticisers and Resins

By LOUIS LIGHT, Ph.D., A.I.C.

LACQUER ingredients derived from castor oil may conveniently be classed as (a) non-drying plasticisers; (b) oils drying by oxidation and polymerisation, similar to natural drying oils like linseed or china wood oil, and (c) drying oils or resins, based not upon castor oil itself but upon the highly unsaturated acid which is one of the products of its high-temperature distillation in the absence of oxygen or, alternatively, upon the residual products of such distillation.

Castor oil is composed to a preponderating extent of the glyceride of the complex ricinoleic acid (or more exactly the mixed glycerides of the stereoisomeric ricinoleic and isoricinoleic acids), but space will not allow of any discussion as to the exact changes attendant upon destructive vacuum distillation or upon condensation with phthalic anhydride and other cheap components. It will be impossible to do more than summarise briefly the processes disclosed in the international patent literature, and this plan is justified in that it indicates those lines of attack more or less monopolised by earlier patentees.

" Non-Drying " Plasticisers

A comparatively early method (Ger. Pat. 564,200) of improving castor oil as a plasticiser (leaving on one side the many well known preparations consisting essentially of air-blown castor oil) consisted in heating it with about 10 per cent. of its weight of phthalic anhydrided. The ingredients were heated together at 180 to 200° C. until the acid value fell to less than 3. The resulting plasticiser possessed excellen compatibility with nitrocellulose and dammar resin.

At a somewhat later date it was proposed (Fr. Pat. 705,069) to condense the crude oil with both an aliphatic dibasic acid containing 4 to 8 methylene groups and glycerol or a higher polyhydric alcohol. Ethylene glycol is unsuitable. The scheme can be illustrated with reference to sebacid acid and glycerol (or mannitol), equimolecular proportions of which are heated to 170° C. for many hours with 25 to 300 per cent. of castor oil (calculated upon the combined weight of the aforementioned ingredients). At an intermediate stage, *i.e.*, after about 10 hours, the reaction products are readily soluble and compatible with nitrocellulose and cellulose acetate, but more prolonged heating, up to a maximum of 20 hours, yields an insoluble product with a remarkable physical resemblance to rubber. It is pointed out in the original specification that products of an otherwise similar process (U.S. Pat. 1,690,515) in which the acid component is succinic, benzoic, tartaric, etc., are less resistant to weathering. This rubber-like material is surprisingly resilient, and another interesting feature is that in spite of its insolubility it can be dispersed in esters and other nitrocellulose lacquers by working in a rubber mill with the solvent. Compositions of the solubilised rubber mass and nitrocellulose are recommended as leather finishes.

Another recent process (Eng. Pat. 403,648) which suggests that the possibilities of oxidised castor oil are by no means exhausted, describes formation of an insoluble jelly by the simple method of blowing the oil with a stream of oxygen-containing gas for 20 hours at 150° C. in a copper-bottomed pot. The jelly is insoluble in the ordinary way in lacquer solvents but it behaves very much like the product described in the previous paragraph in that it can be dispersed in a solvent by working in a cold triple roller mill for one hour and can then be incorporated with nitrocellulose. The compositions are useful as leather finishes since they are quick-drying and do not penetrate unduly into porous surfaces.

Rubbery Masses and Syrupy Liquids

A range of substances varying from rubbery masses to syrupy liquids have been recently recorded as obtainable by condensing castor oil with a half-ester of maleic acid (Eng. Pat. 405.805). It has already been noted that an earlier American patent specified rubbery masses by reacting castor oil with glycerol and a low-molecular dibasic acid. An example of a suitable half-ester is mono-n-octyl-maleate (formed by equimolecular condensation of maleic anhydride and n-octyl alcohol). 310 parts raw castor oil and 152 parts of this half-ester are kept for 3 hours in an open vessel at 195° C. with formation of a pale rubbery liquid soluble in lacquer solvents and capable of serving as a plasticiser for nitrocellulose.

In view of the fact that acetyl butyl ricinoleate has already acquired a high reputation as a plasticiser in the comparatively short time it has been commercially available, it will be useful for the sake of completeness to outline the manufacturing method (U.S. Pat. 1,927,296). Castor oil can be used in the preparation of this substance without prior isolation of ricinoleic acid although it does not yield a very pure ricinoleate. Thus, 40 lb. castor oil and 35.5 lb. butyl acetate in the presence of 2 per cent. syrupy phosphoric acid are refluxed for 2 to 5 hours at 130° C. and the excess of butyl acetate distilled off at 150° C. under 15 mm. pressure. Decolourisation is effected by contact with charcoal at 110° C. The product contains only 50 to 60 per cent. of acetyl butyl ricinoleate and a 90 per cent. product calls for initial saponification of the oil with caustic soda, and esterification with butyl alcohol. Water is eliminated by adding sufficient butyl alcohol to produce a constant boiling mixture in vacuo.

Imparting " Drying Oil " Qualities

Less work has been done upon the problem of imparting drying oil qualities by more or less direct methods to castor oil. Treatment under carefully restricted conditions with glycerol and linseed oil fatty acids in succession is claimed (Ger. Pat. 572,359) to produce a drying oil with conspicuous water-and-alkali-resistance. In the presence of 200 grams calcium glycerate, 46.6 kilos castor oil are continuously stirred with 9.2 kilos glycerol at 275° C. until 2.7 litres of water are evolved. The theoretical amount (84 kilos) of linseed oil acids is stirred in at this point and heating continued to complete esterification. It appears that free alcohol groups are formed by rearrangement in the castor oil molecule by the glycerol condensation and these undergo esterification by the fatty acids.

It is also worthy of note that the addition of metallic driers to the rubbery condensation product of castor oil and n-octyl maleate described above causes it to dry like linseed oil.

" Drying " Oils

Apart from castor oil itself, the unsaturated acid or acids resulting from more or less destructive distillation and the residual products thereof are applicable in several ways to the production of plasticisers, resins and even drying oils.

One of the earliest lines on which the distillation products were exploited consisted in reacting them with a glycerol-phthalic anhydride compound. This approach is, of course, a variation of the general glycerol-phthalic anhydride-unsaturated fatty acid (or glyceride thereof) reaction which is now transforming the very basis of paint manufacture. On stopping the destructive distillation of castor oil to give a distillate of so-called cognac oil at a point before the oily residue becomes insoluble, the latter consists substantially of the glyceride of triundecylenic acid which itself exhibits good drying oil qualities but suffers from the drawback of thickening up with oxide pigments. Condensation in succession with glycerol and phthalic anhydride does not destroy the drying power and such synthetic drying oils (U.S. Pat. 1,799,420) could be pigmented ad thinned to form an air-drying paint or melted up with resins for varnish manufacture. It transpired, however, that hardness and water-resistance left much to be desired, and further research (U.S. Pat. 1,888,595) rectified these defects by partial replacement of the castor oil by china wood oil.

Anti-corrosive stoving varnishes have been recently put forward on the basis of condensing the residue from destructive distillation of castor oil with oleic, ricinoleic or like unsaturated acids in presence of metallic oxides (Eng. Pat. 383,856). Actually, a mechanical mixture of the reactants is applied to the metal surface on which it is desired to produce an insoluble anticorrosive coating and there subjected to stov-

ing treatment. It is essential that oxygen be excluded during destructive distillation so as to avoid polymerisation to a rubbery mass. When applied to a copper or copper alloy surface, the coating operation is simplified by omitting dissolution of a metallic oxide in the fatty acid. It suffices, where practicable, to oxidise the surface at the outset, preferably by anodic oxidation in a bath containing ammonia as the electrolyte.

Whereas the two processes just outlined utilise the residue from destructive distillation, other investigators have not neglected the possibilities of the distillation products themselves, more particularly the doubly unsaturated acid which is most conveniently designated (according to the Geneva nomenclature) as octadecadiene–9,11–acid–1. It is readily isolated by heating castor oil to 200° C. and distilling in vacuo in a CO_2 stream. This diene unsaturated acid readily undergoes condensation, not unexpectedly, with both polyhydric alcohols and polybasic acids. If this threefold reaction is carried out under suitable conditions (U.S. Pat. 1,947,416), it yields pale-coloured resins with excellent solubility. Inclusion of a proportion of drying oil (linseed oil) in the reaction mixtures results in better solubility in turpentine and petroleum solvents. As an example of a resin produced in the absence of drying oil, 100 parts phthalic anhydride, 50 parts glycerol and 100 parts octadecadiene–9,11–acid–1 are fused together with exclusion of air at 180 to 220° C. until clear and until the cooled resin is free from tackiness. This resin, which is claimed to be paler than a straight glycerol-phthalic anhydride resin, can be used as a spirit varnish substitute when dissolved with ordinary metallic driers in an equal weight of ethyl acetate or benzole-toluole.

Improved Water Resistance

Improved water resistance, as well as better solubility in turpentine and petroleum hydrocarbons, is imparted by including linseed or china wood oil in the reaction, although the former yields a resin with less tendency to turn yellow. Without entering into a discussion of the mechanism of this complex reaction, it will suffice to remark that the unsaturated (diene) structure is preserved, thereby accounting, at least in part, for the accelerated rate of drying observed in the presence of metallic driers. Resins of the glycerol-phthalic anhydride type, on the other hand, form films solely by evaporation of the solvent. Suggested proportions of ingredients (which are cooked at 230° C) are phthalic anhydride 100 parts, glycerol 50, octadecadiene–9,11–acid–1 50; and linseed stand oil 50. This resin has also the useful property of blending with nitro-cellulose.

The principal fatty acid of china wood oil only differs from the diene acid in containing an additional conjugated double bond, the chief constituent of the oil being the triglyceride of octadecatriene–9,11,13–acid–1. Attempts to synthesise the glyceride of the latter acid in the pure form have failed owing to premature gelatinisation at the high temperature involved. Yet the diene acid offers no obstacle to complete esterification and undergoes practically no thickening during the process of conversion to the glyceride. The octadecadiene acid forming so important a component of the aforementioned type of resin has consequently been used with marked success to produce a drying oil bearing in some respects a startling resemblance to china wood oil yet showing much less tendency to gelatinise when heated to close on 300° C. In brief, this object was achieved by treating wood oil itself with the octadecadiene–9,11–acid–1 and completely esterifying the product with glycerine (Scheiber, "Angew. Chem.," 1933, 645).

The wood oil-diene acid-glycerol condensation product may thus be regarded as a compromise between the triene glyceride with its inconvenient gelatinising propensity and the diene glyceride which shows practically on tendency to gelatinise under the average time and temperature conditions of varnish manufacture. Its superiority to china wood oil on this score can be realised from the fact that it can be heated for 1 to 2 hours at 285° C. before gelatinising compared with about 15 minutes in the case of china wood oil.

Another type of drying oil which can be prepared on the basis of the diene acid is not unlike Japanese lacquer in respect of physical properties and actually bears a distinct chemical resemblance to the latter. The method applied (Ger. Pat. 557,339) is condensation with a polyhydric phenol in presence of a metallic catalyst. Thus, an equimolecular mixture of the diene acid and resorcinol is heated at 120° C. in the presence of a little zinc chloride for several hours when a clear oil is isolated which hardens in film form in presence of a cobalt drier. A similar process, based upon ricinoleic acid, has been exploited by a French company (Fr. Pat. 755,422). The condensation product with pyrogallol is here claimed to yield a beautiful black varnish film after stoving.

Two New Stripping Agents

Eliminating Waste in the Textile Industry

THE immediate recognition of scientific achievements and their translation into practice must all play a part in helping British textile industries to survive the present intensive competition with which they are faced in the markets of the world. For this reason the two new stripping agents, Lissolamines A and V, which are being produced by the British Dyestuffs Corporation, will be of great importance to the textile trade.

These new chemical compounds enable the modern industrialist to achieve results which have been hitherto impossible, and at the same time they play an important part in eliminating waste. Two main factors are symptomatic of the modern trend in dyed materials—fastness and fastidiousness. Faster and still faster dyestuffs must be used, and less and less latitude is given to the dyer. "D. & K."—damaged and kept—all too often represents the margin between profit and loss; and yet it is difficult to see how the situation is to be improved when any slight mistake that is made in dyeing many of these fast colours means that the dyeing cannot be rectified. Many modern dyes are so fast that no chemical will bleach them save those which are so strong as to destroy the fabric.

It is here that Lissolamines A and V are so effective. They allow dyeings hitherto looked upon as unbleachable to be readily stripped back again to the white fabric. They do this without the slightest injury to the fibre. The azoic range of dyestuffs—to-day one of the most popular series for obtaining shades of the highest fastness to washing—can all be stripped to a white by the use of Lissolamine A. The dyed material is simply boiled in a solution containing from 1—2 per cent. of Lissolamine A on the weight of material together with an alkaline reducing agent such as alkaline hydrosulphite. The products of decomposition of the dyestuff sometimes stain the material but these can readily be removed by a few minutes immersion in a dilute chemick solution. Not only the azoic range of dyestuffs but many other resistant colours such as Turkey red—even that dyed by the old and fastest method—can be equally readily removed from the fabric. The same applies to the fast chrome mordant colours on cotton and the use of Lissapol A also considerably assists in stripping all classes of dyestuffs on cotton whether they be particularly fast or not.

For fast vat dyeings a special product, Lissolamine V, has been designed. Here it is not always possible to strip every colour down to the white cotton yarn. Whilst a number will react in this manner the majority are stripped to a very pale shade and a few vat dyeings, particularly the blacks and browns, are very difficult to reduce. The process for working with Lissolamine V is the same as for Lissolamine A.

The value of these assistants in enabling one to rectify spoilt dyeings is obvious, but the absolute nature of the stripping process is such that one is now able to utilise redundant stocks of many colours which can now be stripped to a white, whilst formerly they could only have been "jobbed off" or re-dyed black or dark shades.

The Institution of Gas Engineers

Some Points from Mr. F. P. Tarratt's Presidential Address

THE seventy-first annual general meeting of the Institution of Gas Engineers was held at the Institution of Civil Engineers, London, from June 5 to 7, under the presidency of Mr. F. P. Tarratt, engineer of the Newcastle-upon-Tyne and Gateshead Gas Co. Mr. C. Valon Bennett, engineer, general manager and secretary of the Rochester Gas Co., was elected president for 1934-1935, and Colonel W. Moncrieff Carr, T.D., engineer, general manager and clerk of the Stretford Gas Board, and Mr. Stephen Lacey, controller of gas sales to the Gas Light and Coke Co., were elected vice-presidents.

Mr. TARRATT, in his presidential address at the annual meeting on June 5, said the outstanding event of the year was the visit of gas engineers and other representatives of the gas industry last autumn to Canada and the United States. Impressions of the gas industry in those countries formed the basis of three papers by Colonel W. M. Carr, Mr. C. A. Masterman, and Mr. Thomas Carmichael. Their Canadian and American friends were anxious that they should record and discuss their impressions, and he hoped that their value would be enhanced by useful discussions on the comparison between American and British practice in the production, distribution, and utilisation of gas and the business conduct of gas undertakings.

Contrary to what might be expected, their visit to the United States had not convinced him that the merging of the Institution, the National Gas Council, the British Commercial Gas Association, and the Society of British Gas Industries into one organisation on the lines of the American Gas Association would be advantageous. This was no reflection on their American colleagues or their association, the essential usefulness and strength of which could not be too strongly emphasised. The historical and economic development of the American Gas Industry, however, had been entirely different from that of the British gas industry and no useful analogy presented itself in the American Gas Association and the four British gas organisations, which, like the British constitution, were illogical in theory but extremely effective in practice.

Close personal contact existed in their separate organisations and any shortcomings in their work would not necessarily be remedied by "constitution-mongering." Indeed the remedy had already largely been found in the recently constituted joint co-ordinating committee, which—equally representative of the Institution of Gas Engineers, the National Gas Council, and the British Commercial Gas Association—had done much to co-ordinate the work of the separate organisations. Formed particularly to discuss broad matters of policy, he hoped it would provide a lead on many important problems by communicating its views to those responsible for the conduct of gas undertakings. Two national conferences were called last year, as a result of which it was decided that the work to be done justified the joint annual subscription to the central fund of the three organisations being increased to ten shillings per million cu. ft. of gas sold. The joint co-ordinating committee had established a technical sub-committee representative of the recently formed industrial gas development centres.

Gas Referees

He regretted that under the Gas Undertakings Bill it was proposed that the duties of the gas referees should be transferred to the Board of Trade in January, 1939. The industry owed much to the ability and impartiality of the gas referees in carrying out their obligations and in safeguarding the interest of gas consumers. It was doubtless due to their consummate tact that the radical changes in the Gas Regulation Act, 1920, were made operative with so little inconvenience to all concerned.

The gas industry was in a more intensely competitive position than ever before; every advance had to be made with care yet with courage born of confidence in the commodity offered. The great need of the world to-day was a revival of international trade, so that the heavy industries might regain a volume of trade which was adequate for their efficient and economic development, even for their very existence. From such a revival the gas industry would directly and indirectly prosper.

The competition they had to meet made it evident that, using to the utmost the machinery and resources of the four national gas organisations, they must adopt fresh methods and extend existing and develop new uses for gas and its by-products. He was optimistic enough to think that, if the industry realised immediately the importance of research and technical investigation on a scale hitherto hardly visualised, they might regard the full development of the use of gas as just commencing rather than terminating as some professed to believe. They must, however, recognise their limitations; no one fuel had all virtues. If they concentrated on those many uses for which gas was equal or superior to all other fuels, their critical competitors would be deprived of much of their ammunition. In Canada and the United States the availability of cheap electricity had not excluded gas, which, in fact, was used to an increasing extent, the consumer recognising the merits of gas and electricity and using each for the purposes for which it was best suited.

Research

By the end of the present year the British Refractories Research Association would have published 34 bulletins, embracing 185 papers and reports of their investigations while the total amount expended annually had rarely been more than £4,500. It was gratifying to think that the gas industry responded adequately to the appeal recently made for increased funds to support and extend this valuable work. As early as 1912 certain specifications for gasworks refractories were drawn up, these being the first specifications for refractories to be formulated by any industry in this country. Revised specifications were issued in 1922 and 1925, and during the past year considerable time had been spent by the joint sub-committee on their further revision in the light of recent advances.

The corrosion of metals was being investigated by the Joint Research Committee of the Institution and Leeds University, the ultimate object being the elimination of corrosion troubles and their attendant inconvenience and expense. Sulphur compounds in the gas were mainly responsible for this corrosion and every endeavour must be made, therefore, to reduce the sulphur content. As the removal of sulphur might prove costly, however, it was necessary to determine, by balancing the costs of purification against those of maintenance, if its partial removal was not the most economical. Laboratory experiments must accord with the essential factors of service conditions. Twelve materials had been already subjected for nearly a month to the continuous action of the products of combustion from coal gas and their resistance to corrosion had been classified. Further experiments would be made with gas containing diminishing sulphur contents, and to investigate further those materials which had shown the greatest resistance to corrosion, namely, lead, tin, and their alloys. If they considered the improvements in the quality of gas since the thermal method of charge resulted in a uniform specific gravity, freedom from naphthalene and low moisture content, it should not be beyond their power to reduce the sulphur content.

It was practically impossible to evaluate the research work carried out by the gas industry. Improvements in refractory materials alone had considerably lowered the cost of the repair and maintenance of carbonising plants and has enabled them to increase the productive capacity of manufacturing plant far beyond anything foreseen twenty years ago. The leading manufacturers of gas apparatus had done much in recent years in their research laboratories to produce more efficient and more economical appliances for cooking and heating purposes, although the prices of such appliances, like the charges for gas, could be lowered to facilitate com-

petition with other increasingly efficient appliances using different fuels.

Since the grant of a royal charter in 1929, the Institution had endeavoured each year to include in its normal and progressive programme of work, something of unusual importance. Thus, in 1930, the Institution convened the first International Gas Conference in London, whilst this year the second International Gas Conference would be held in Zurich, under the auspices of the International Gas Union and the presidency of Herr Fritz Escher, of Switzerland. The programme of the conference showed that certain member nations of the Union were to present reports which would summarise and contrast the differences in the practice of gas manufacture, distribution, utilisation, and administration in the many countries belonging to the Union. It was hoped that engineers and administrators of gas undertakings in Great Britain would avail themselves of the opportunity of participating in the discussions on the reports.

Industrial Relations

Sir Harry McGowan on the Machine and the Spirit

SIR HARRY MCGOWAN, chairman of Imperial Chemical Industries, Ltd., in an address at the annual luncheon of the National Industrial Alliance, in London, on May 30, said the real problem of industrial relations lay in finding how to fit the gospel of humanism into the workaday affairs of a commercial undertaking. The solution did not depend on the expenditure of large sums of money on philanthropic frills and paternal patronage, but it depended first and foremost on the ability to see the other man's point of view and then on the will to take notice of that point of view as far as practicable. By their treatment of the problem, those who upheld the individualist as opposed to the Socialist concept of industry would be judged within the next few years.

The claims of the several interests involved in industry—shareholders, staff, manual workers and customers—appeared at first sight to conflict hopelessly, but the longer and more proper view was that the direct opposite was the truth. Self-interest was still, unfortunately, the dominant motive in human affairs, but it was only by subordinating self-interest to service that industrialists could offer an alternative to rash Socialist experiments with the social structure of the country.

The I.C.I. Labour Policy

Sir Harry said the need for examining the possibilities of the capitalist system in relation to the hopes and ambitions of all who earned their living under it was an urgent one. He hoped that trade in the United Kingdom was at long last on the up-grade, but the maintenance of industrial peace through the coming years would make all the difference in the place Great Britain was to occupy among the trading nations of the world. In the past we had retained our trade supremacy in spite of industrial disputes, but we literally would not be able to afford them in the future. Our competitors were too nearly on our heels. Nor did industrial peace mean merely the absence of dispute, but a condition of affairs in which by reason of the confidence between all engaged, everybody put forth his best efforts.

The company of which Sir Harry was chairman had from its inception tried to establish that confidence among its personnel of close on 50,000. If they had not entirely succeeded, they had made marked progress. This had been achieved by deliberately adopting a policy in industrial relations in the same way as commercial, technical and research policies were adopted. They had sat down to think out means of winning the co-operation of employees, and had established a permanent department charged with the responsibility of advising in these matters. The labour policy was based on the four C's—contact, consultation, confidence and co-operation, the first two of which begat the last two.

Machinery of Contact

It was not an easy task to establish contact with employees in nearly sixty factories dotted over the United Kingdom. Workers in each factory were invited to elect a number of representatives to sit on a works council, and an equal number of members of the management were appointed to sit with them. These councils met monthly. At a later stage the councils of factories engaged in the manufacture of similar products were associated in group councils, similarly constituted and meeting twice a year. From these councils, delegates were appointed to a central council representing the whole company, which met twice a year and which was personally presided over by Sir Harry McGowan as chairman. By these arrangements, any question *except wages* that worried the workers at one particular factory could be referred to the appropriate group council, and if not disposed of there, to the central council, where the chairman and board of directors could hear and take part in the discussion. These councils provided the contact between the management and the workers, which was regarded as so essential. The degree of value placed on them by the employees themselves might be judged from the fact that at the last annual election in March, 87½ per cent. of the employees went to the poll.

No " Hush-Hush " Atmosphere

The councils were used for consultation with employees. They were told everything about the company that could possibly be told. " We are progressively breaking down," said Sir Harry, " that traditional ' hush-hush ' atmosphere in which the affairs of companies are shrouded. At each meeting of a works council, the works manager tells his council about the position of the works, the state of the order book, new improvements in processes or plant, prospects for the next month, etc. At the group council meeting the group chairman does the same sort of thing for his product group as a whole; while at the central council I give a review of a wider character, dealing with I.C.I.'s position generally." These councils thus bred confidence between management and worker and thereby induced the wholehearted co-operation of both.

Nearly 6,000 Staff Graded Workers

It had further been determined as far as practicable to increase the workers' sense of security. The biggest problem with which the working man was faced was his lack of security in his job and in his income. It was realised how he dreaded the thought of dismissal at an hour's notice, or of a prolonged illness. The occurrence of a Bank Holiday was not an unmixed joy to him when it involved a short week's wages. Accordingly a scheme was authorised whereby any worker, male or female, artisan or labourer, was eligible after five years of service, for promotion to a staff grade. In that grade his work remained the same, but he was guaranteed his wage throughout the year and was given a month's notice either of suspension or discharge. In addition, if he suffered from accident or illness he received wages for six months. Nearly 6,000 workers had already been promoted to this grade. The comparative stability ensured by this arrangement had been of inestimable value to the worker, and evidence was constantly being received of his appreciation and his determination not to abuse the privilege.

Sir Harry observed that though he had dwelt on the machinery, it was not the " schemes " but the " spirit " that counted. " It is not what you do *for* people, but what you do *with* them, that matters. No scheme, however good, will win your people if they believe they are only check numbers to the management. This is perhaps the most difficult task of all—to inculcate the right outlook down the management line through all ranks, including the foreman."

The Chemical Age Lawn Tennis Tournament

Silver Statuettes for the Winners : Second Round Draw

WE have pleasure in announcing that Thomas Hill-Jones, Ltd., of Invicta Works, Bow Common Lane, E.3, have kindly promised to present "Invicta" silver statuettes to be awarded outright to the winners of the doubles and the singles in the fourth annual CHEMICAL AGE Lawn Tennis Tournament, and that Mr. W. Lloyd-Willey, director of the same company, is presenting silver statuettes of similar pattern, to be known as the "Lloyd-Willey" statuettes, for each of the three runners-up. The winners of the doubles and singles respectively will hold, jointly with the firms they represent, THE CHEMICAL AGE silver challenge cups for twelve months.

We hope to make an important announcement shortly concerning the date and venue for the finals.

Monday was the closing day for the first round matches, and the draw for the second round has been made this week, full details of which are given below. The unsettled weather in the spring resulted in a rather late start and some of the early matches had to be scratched. Of the matches played, the most notable have been the defeat of the runners-up in the doubles in 1933 (Pennington, of J. Crosfield and Sons, Ltd., Warrington, with a new partner in S. Pasquill) by the winners of the cup in 1932 (W. Speakman and S. E. Chaloner, of Monsanto Chemical Works, Ltd., Ruabon) and the continued success of C. G. Copp (Doulton and Co., Ltd.), the holder of the singles cup. Both Speakman and Chaloner are in the singles and have received a bye in the first round. Copp has beaten H. L. Sheppard (R. W. Greeff and Co., Ltd.) in the singles, and with his partner, R. D. Hayman, he has also beaten H. R. Rowlinson and R. H. Whiteman (British Drug Houses, Ltd.) in the doubles.

Unfortunately, F. G. Hawley and J. Haines (Anglo-Persian Oil Co., Ltd.), holders of the doubles cup, have not yet been able to play off their first round match against E. M. Jones and R. C. Eden (B. Laporte, Ltd., Luton). Rather than reach an arbitrary decision, the Editor of THE CHEMICAL AGE, as referee, has granted an extension of time in which to play off this match, the winners of which will meet P. Smith and B. T. Francis (Bakelite, Ltd.) in the second round.

First Round Results

The first round results are as follows:—

SINGLES.

R. N. B. D. Bruce (Gas Light and Coke Co., Ltd.) beat R. D. Hayman (Doulton and Co., Ltd.), 6-4, 6-2.

Albert Baxter (United Yeast Co., Ltd.) beat W. G. C. Backinsell (Le Grand Sutcliff and Gell, Ltd.), 6-4, 7-5.

C. G. Copp (Doulton and Co., Ltd.) beat H. L. Shephard (R. W. Greeff and Co., Ltd.), 7-5, 6-2.

L. Giltrow (Williams (Hounslow), Ltd.) walk-over, A. L. Dix-Perkin (International Pulverisers, Ltd.), scratched.

F. H. Choppin walk-over, P. A. Nottingham (Le Grand Sutcliff and Gell, Ltd.), scratched

G. F. Hammond (Williams (Hounslow), Ltd.) walk-over L. R. Fradin (Borax Consolidated, Ltd.), scratched.

H. A. Hare (Grindley and Co., Ltd.) beat D. G. Blow (The British Drug Houses, Ltd.), 6-0, 6-0.

Arnold Tickner (British Celanese, Ltd.) beat H. A. Steel (Society of Chemical Industry), 3-6, 6-0, 6-1.

DOUBLES.

A. S. Marcar and G. H. Trigg (Bovril, Ltd.) beat M. H. How and J. Shaw (Johnson, Matthey and Co., Ltd.), 6-4, 6-0.

E. Thomsett and R. Welsh (British Oxygen Co., Ltd.) beat J. Hudson and L. A. Maronge (Bakelite, Ltd.), 6-2, 6-3.

E. H. M. Badger and R. N. B. D. Bruce (Gas Light and Coke Co.) beat R. F. Porter and R. S. Law (Howards and Sons, Ltd.), 6-0, 6-1.

A. Collins and H. Sibley (British Oxygen Co., Ltd.) beat S. Harbour and B.J. Eckett (Williams (Hounslow), Ltd.), 7-5, 6-3.

G. Stanford and J. Shirreff (Johnson, Matthey and Co., Ltd.) beat D. G. Blow and L. W. Russell (British Drug Houses, Ltd.), 6-3, 6-2.

F. R. O. Allen and R. A. J. Bennett (Nobel Chemical Finishes, Ltd.) beat A. Tickner and J. S. Wilson (British Celanese, Ltd.), 7-5, 7-5.

A. G. R. Clarke and E. C. Browne (G. A. Harvey and Co. (London), Ltd.) walk-over, F. O'Connor and E. Dacre Lacy (Murex Welding Processes, Ltd.), scratched.

C. G. Copp and R. D. Hayman (Doulton and Co., Ltd.) beat H. R. Rowlinson and R. H. Whiteman (British Drug Houses, Ltd.), 6-0, 6-1.

R. A. Nottingham and F. Pritchard (Le Grand Sutcliff and Gell, Ltd.) beat H. W. Drew and W. G. Baldock (Williams (Hounslow), Ltd.), 7-5, 1-6, 6-3.

Leonard Jones and Alan V. Rhead (Chance and Hunt, Ltd., Birmingham), beat W. B. Miller and G. Lord (British Celanese, Ltd., Derby), 6-2, 6-2.

V. J. Prosser and A. Baxter (John Haig and Co., Ltd.) walk-over, C. H. Jones and P. N. Blythe-Brook (Anglo-Persian Oil Co., Ltd.), scratched.

W. Speakman and S. E. Chaloner (Monsanto Chemical Works, Ltd., Ruabon) beat R. C. Pennington and S. Pasquill (J. Crosfield and Sons, Ltd., Warrington), 2-6, 6-4, 7-5.

W. M. Harper and H. P. Gold (I.C.I., Ltd., Birmingham) walk-over, W. G. Hiscock and J. S. Boyd (I.C.I., Ltd., Grangemouth), scratched.

P. Smith and B. T. Francis (Bakelite, Ltd.) beat F. C. White and A. W. White (Howards and Sons, Ltd.), 7-9, 6-3, 7-5.

A. E. C. Willshere and L. F. Grape (Borax Consolidated, Ltd.) beat H. A. Steel and F. H. Choppin (Society of Chemical Industry), 6-2, 6-1.

Second Round Draw

Full details of the draw for the second round are as follows. All matches in this round must be played by July 2, and the results forwarded to reach the Editor of THE CHEMICAL AGE by first post on July 3.

SINGLES.

Tickner, Arnold. British Celanese, 22 & 23, Hanover Square, London, W.1. (Mayfair 8000, Ext. 137.)	*v*	**Welsh, R.** British Oxygen Co., Angel Road, Edmonton. (Tottenham 2488.)
Choppin, F. H. 63, Woodyates Road, Lee, London, S.E.12.	*v*	**Collins, A.** The British Oxygen Co., Ltd., Angel Road, Upper Edmonton, London. (Tottenham 2647.)
Thomsett, E. British Oxygen Co., Angel Road, Edmonton. (Tottenham 2488.)	*v*	**Marcar, A. S.** Bovril, Ltd., 148-166, Old Street, London. (Clerkenwell 1202.)
Copp, C. G. Doulton & Co., Ltd., Lambeth, London, S.E.1. (Reliance 1241.)	*v*	**Trigg, G. H.** Bovril, Ltd., 148-166, Old Street, London, E.C.1. (Clerkenwell 1202.)
Whittaker, H. R. Williams (Hounslow), Ltd., Hounslow, Middlesex. (Hounslow 1166, Ext. 7.)	*v*	**Maronge, L. A.** Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)
Grape, L. F. Borax Consolidated, Ltd., Regis House, King William Street, London. (Mansion House, 8332.)	*v*	**Window, John.** Spencer, Chapman & Messel, North Woolwich Road, Silvertown, London. (Albert Dock 2168.)
Alldis, W. L. Brandhurst Co., Ltd., Vintry House, Queen Street Place, London, E.C.4. (Central 1411.)	*v*	**Wilson, J. S.** British Celanese, Ltd., 22/3, Hanover Square, London, W.1. (Mayfair 8000, Ext. 137.)
Hare, H. A. Grindley & Co., Ltd., Upper North Street, Poplar, London, E.14. (East 0058.)	*v*	**Peake, I. R.** R. W. Greeff & Co., Ltd., 4, Thames House, Queen Street Place, London, E.C.4. (Central 6550-9.)
Law, Rupert S. Howards & Sons, Ltd., Uphall Works, Ilford, Essex. (Ilford 1113.)	*v*	**Baxter, Albert.** United Yeast Co., Ltd., 238, City Road, London, E.C.1. (Clerkenwell 0303.)
Porter, Ronald F. Howards & Sons, Ltd., Uphall Works, Ilford. (Ilford 1113.)	*v*	**Pritchard, F.** Le Grand Sutcliff & Gell, Ltd., The Green, Southall. (Southall 2211.)
English, Chas. S. H. Johnson & Co., Ltd., Carpenters Road, Stratford, London, E.15. (Maryland 3657.)	*v*	**Bruce, R. N. B. D.** Gas Light & Coke Co., No. 1 Laboratory, Kings Road, Fulham, S.W.6. (Fulham 5531.)
Giltrow, L. Williams (Hounslow), Ltd., Hounslow. (Hounslow 2929.)	*v*	**Lacy, E. D.** Murex Welding Processes, Ltd. Ferry Lane Works, Forest Road, Walthamstow, London. (Larkswood 2284.)

Smith, P.
Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)
v
Hammond, G. F.
Williams (Hounslow), Ltd., Hounslow, Middlesex. (Hounslow 1166.)

Jones, Leonard.
Chance & Hunt, Ltd., Park Lane, Oldbury, Worcs. (Broadwell 1521.)
v
Chaloner, S. E.
Monsanto Chemical Works, Ltd., Ruabon, North Wales. (Ruabon 3.)

Speakman, W.
Monsanto Chemical Works, Ltd., Ruabon, North Wales. (Ruabon 3).
v
Tunstall, P. A.
Salt Union, Ltd., 20. Water Street, Liverpool. (Central 4370.)

Whittaker, Edwin.
A. C. Wells & Co., Ltd., Carnarvon Street, Cheetham, Manchester. (Blackfriars 8044.)
v
Williams, I.
Monsanto Chemical Works, Ltd., Ruabon, North Wales. (Ruabon 3.)

DOUBLES.

Harper, W. M., & Gold, H. P.
I.C.I., Ltd., Oldbury, Birmingham. (Broadwell 1521.)
v
Speakman, W., & Chaloner, S. E.
Monsanto Chemical Works, Ltd., Ruabon, North Wales. (Ruabon 3.)

Allen, F. R. O., & Bennett, R. A. J.
Nobel Chemical Finishes, Ltd., Slough, Bucks. (Slough 528/537.)
v
Prosser, V. J., & Baxter, A.
John Haig & Co., Ltd., Kinnaird House, 2, Pall Mall East, London. (Whitehall 1040.)

Copp, C. G., & Hayman, R. D.
Doulton & Co., Ltd., Lambeth, S.E.1. (Reliance 1241.)
v
Clarke, A. G. R., & Browne, E. C.
G. A. Harvey & Co. (London), Ltd., Woolwich Road, London, S.E.7. (Greenwich 0020, Ext. 311.)

Collins, A., & Sibley, H.
The British Oxygen Co., Ltd., Angel Road, Upper Edmonton, N.18. (Tottenham 2647.)
v
Willshere, A. E. C., & Grape, L. F.
Borax Consolidated, Ltd., Regis House, King William Street, London. (Mansion House 8332.)

Marcar, A. S., & Trigg, G. H.
Bovril, Ltd., 148-166, Old Street, London, E.C.1. (Clerkenwell 1202.)
v
Jones, Leonard, & Rhead, Alan V.
Chance & Hunt, Ltd., Park Lane, Oldbury, Worcs. (Broadwell 1521.)

Nottingham, R. A., & Pritchard, F.
Le Grand Sutcliff & Gell, Ltd., The Green, Southall. (Southall 2211.)
v
Badger, E. H. M., & Bruce, R. N. B. D.
Gas Light and Coke Co., No. 1 Laboratory, Fulham. (Fulham 5531.)

Stanford, G., & Shirreff, J.
Johnson, Matthey & Co., Ltd., 78, Hatton Garden, London, E.C.1. (Holborn 6989.)
v
Thomsett E., & Welsh, R.
British Oxygen Co., Ltd., Angel Road, Edmonton. (Tottenham 2488.)

Hawley, F. G., & Haines, J.
Anglo-Persian Oil Co., Ltd., Britannic House, Finsbury Circus, London, E.C.2. (National 1212.)
v
Smith, P., & Francis, B. T.
Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)

Jones, E. M., & Eden, R. C.
B. Laporte, Ltd., Kingsway, Luton Beds. (Luton 891.)

Notes and Reports from the Societies

Royal Institution

Lord Rutherford on "Rare Gases"

THE varied commercial uses of rare gases discovered by scientists at the end of the nineteenth century were referred to by Lord Rutherford in a lecture delivered at the Royal Institution on May 30.

Lord Rutherford said that there is no more interesting story in the history of science than the sequence of events, towards the close of the last century, which led to the discovery and isolation of a new group of rare gases existing in the atmosphere by Lord Rayleigh and Sir William Ramsay. The discovery that argon is present in the air in about one per cent. by volume was rapidly followed by the discovery of a whole new group of inert gases, namely, helium, neon, krypton and xenon. Neon is present in the air in only about one part in 100,000 by volume, and helium, krypton and xenon are present in still smaller quantities. In the early stages, these gases could only be separated in small quantities after much expenses and trouble, and in a sense were regarded as scientific curiosities. The subsequent development of large liquid air plants for the separation of pure oxygen from the atmosphere, in which many thousands of tons of air are liquefied annually, made possible arrangements for the separation of argon and neon in considerable quantities. On account of their characteristic properties, some of these gases have been found exceedingly useful to industry. For example, more than 30,000 cubic metres of argon are used annually in Europe in the production of the highly efficient gas-filled electric lamps. In all, about 45 million of these lamps are made each year, requiring the separation of argon from more than 5,000 tons of air. The ease with which an electric discharge passes through neon, and its characteristic luminosity, have led to a great development in the use of this rare gas for the illuminated signs with which we are so familiar in our cities to-day.

In some respects, continued Lord Rutherford, the history of the use of helium has been more striking. The presence of this gas was first detected in the sun by Sir Norman Lockyer in 1868, and for this reason he named it "helium." The presence of helium on the earth was first observed by Ramsay in 1895 in the gases released from old radioactive minerals. In the course of the next ten years, a few cubic metres of helium were laboriously extracted from radioactive minerals. During the war, the Board of Invention and Research of the Admiralty recognised that it would be much safer if observation balloons and dirigibles could be filled with a light, non-inflammable gas like helium rather than with hydrogen, for there is only 8 per cent. difference in their respective lifting powers. At the suggestion of the Board, Professor J. C. McLennan, of the University of Toronto, made a systematic examination of the helium resources of the Empire. It was found that large supplies of helium were available in the natural gas fields of southern Alberta, and arrangements were made on a semi-commercial scale to purify the helium by liquefying the methane and other gases present. About the same time, the Bureau of Mines of the United States began similar experiments, using the natural gases of Texas, which are rich in helium. At the end of the war, millions of cubic feet of helium were separated by liquefaction methods, and the cost was found to be sufficiently low to use it in airships in place of hydrogen.

Iron and Steel Institute

Annual Meeting

VALUABLE work by the British Cast Iron Research Association was described in a paper on the elasticity, deflection and resilience of cast iron, presented by Mr. J. G. Pearce, at the annual meeting of the Iron and Steel Institute held in London on May 31. Work by the International Tin Research and Development Council on tin-iron alloy in tinplate was the subject of a paper by Mr. W. C. Hoare, who detailed a study of certain defects observed in commercial tinplates. The Council's work on iron-tin reaction products was dealt with in a joint paper by Mr. W. D. Jones and Mr. W. C. Hoare. A report on the reply to a questionnaire circulated to iron manufacturers at the instigation of the Blast Furnace Refractories Joint Committee concerning the durability of refractory materials in blast-furnaces was presented for discussion by Mr. A. T. Green (Stoke-on-Trent), and Messrs. A. T. Green, W. Hugill, F. H. Clews and H. Ellerton, jointly presented a paper on some properties of the fireclay products used for blast-furnace linings.

Birmingham Metallurgical Society

Award Under Students' Prize Scheme

THE annual meeting of the Birmingham Metallurgical Society was held on May 31, when the following were appointed officers: Mr. J. Fallon, president; Messrs. N. P. Allen, E. A. Bolton, J. A. A. Frazer and A. L. Molineux, vice-presidents; Mr. A. C. Craig, treasurer; Messrs. Poppleton and Appleby, auditors; Messrs. E. Pagett and L. C. Batchelor, scrutineers; Messrs. F. Willetts, A. G. Griffiths, W. C. Freeman, C. O. Wagner and F. H. Neal, members of the council; and Mr. F. G. Tustin, secretary.

The annual report stated that the session had been one of exceptional activity, particularly in the quest for new members. The campaign had resulted in four commercial subscribers and fifteen ordinary members being admitted. The committee of the Midland Metallurgical Societies, consisting of three delegates from each of the councils of Birmingham

Metallurgical Society, Staffordshire Iron and Steel Institute, and the local section of the Institute of Metals, was to be congratulated on the excellent manner in which it had carried out its duties. The increased attendance and smooth arrangements in the general workings at the James Watt Memorial Institute was a compliment to the efforts of this committee.

Under the students' prize scheme, several essays had been judged and the society's bronze medal and books to the value of five guineas had been presented to Mr. Joseph Hinde for his paper on "Some Metallurgical Aspects of Welding." A second prize, a book prize valued at one guinea, had been won by Mr. Horace Swain for his essay on "Some Notes on Modern Carbon Case-Hardening." The Council hoped that more students would avail themselves of the opportunity this scheme presented and compete for the honours offered.

Society of Chemical Industry

Yorkshire Section : Visit to Experimental Farm

THE Yorkshire Section of the Society of Chemical Industry and the Hull Chemical and Engineering Society have jointly arranged a visit on Saturday, June 16th, to the experimental farm of the Yorkshire Council for Agricultural Education. Members of the Institute of Chemistry are invited to participate. The farm is situated at Askham Bryan, about four miles west of York on the main Leeds-York road. The party will be conducted round the farm and shown the experimental work in progress, viz., experiments on the rearing and fattening of cattle, sheep, pigs and poultry; variety trials with wheat, oats, barley, kale and swedes; manuring experiments on potatoes, swedes, meadow hay and other farm crops; and the use of chemicals for the destruction of weeds.

British Science Guild

Annual General Meeting

THE annual general meeting of the British Science Guild will be held on June 12, at 4 p.m., at the Royal Society of Arts, Adelphi, when the President of the Guild, the Rt. Hon. Lord Melchett, will preside. The meeting will be followed by a popular lecture (illustrated by lantern slides and experiments) on "Friction,'" by Professor E. N. da C. Andrade, D.Sc., Ph.D., Quain Professor of Physics in the University of London. Tickets admitting to the annual general meeting and the lecture may be obtained free of charge from the Secretary, British Science Guild, 6 John Street, Adelphi, London, W.C.2.

Flame-Resisting Rubber Tiling

Use of "Seekay" Wax

CONSIDERABLE importance must attach to any impregnation process which renders rubber floor-covering flameproof, and is enhanced by the increasing use of rubber in the form of floor-tiles and as a structural material generally. Severe tests have been carried out on specimens of rubber tiling impregnated with "Seekay" wax, a non-inflammable chloronaphthalene wax manufactured by a subsidiary company of Imperial Chemical Industries, Ltd. These tests, which have been made by Johnson and Phillips, Ltd., the well-known firm of electrical cable makers, have established the efficiency of "Seekay" wax as a flame-proofing agent.

"Flame-proofing," it should be noted, implies treatment to resist flame and prevent it spreading along the material treated. Standard tests include placing the processed rubber for a specified time in the hottest part of the flame of a bunsen burner when it should be remarked that the flame gets no hold on the rubber. Treatment with "Seekay" wax is an extension of the process already successfully applied to electrical cables, and it may be carried out without detriment to the colour or surface of the rubber, or to those qualities, such as flexibility and tensile strength, in which lies the value of rubber as a structural material.

The Testing of Disinfectants

A Standard Technique for the Rideal-Walker Coefficient

THE British Standards Institution have just issued a British standard technique (Specification No. 541—1934) for determining the Rideal-Walker coefficient of disinfectants, which is recommended for general adoption by all who purchase and supply disinfectant on the basis of a Rideal-Walker coefficient.

The Rideal-Walker method of comparing disinfectants was first published in 1903. Since then modifications have been suggested in the procedure, not only by the authors of the test, but also by other workers, with the result that at the present moment there are several variants of the method in use. This has led to a great deal of confusion and to numerous disputes between buyers and sellers of disinfectants because of the lack of certainty as to the details of the method by which the Rideal-Walker coefficient of the particular disinfectant had been estimated. Since numerous buyers of disinfectants all over the world specify that the material they require must have a certain Rideal-Walker coefficient, it is of the greatest importance that any ambiguity as to the exact technique to be employed should be removed. With this end in view, the procedure set out in the British standard technique was drawn up after a careful series of investigations had been made in regard to the points which were likely to influence the resultant Rideal-Walker coefficient. No departure from the original technique has been made, nor has any complication been introduced, unless experience has shown that some modification was necessary.

The object of the standardised technique is to ensure that the buyer and the seller, when a particular Rideal-Walker coefficient is part of the requirements for the disinfectant, both use precisely the same method when determining this coefficient on samples of bulk deliveries.

In the present state of knowledge there is no laboratory test which is generally accepted as a reliable index of the disinfectant capacity of all types of disinfectants under every condition of use. It should, therefore, be clearly understood that the publication of this British standard technique for determining the Rideal-Walker coefficient of disinfectants implies no endorsement or otherwise of its value as an indication of the disinfectant potency of the preparation tested, in comparison with that of phenol, under practical conditions.

Birthday Honours List

An Award for the Discoverer of Insulin

THE King's Birthday Honours List, which was published on June 4, contained several names of interest to science and industry.

Lord Wakefield, who has been elevated to a viscounty, has been a pioneer of civil aviation, and has also been a munificent supporter of hospitals; he gave £25,000 for the Empire research work at the Imperial Institute.

Sir Hugo Hirst, created a baron, was the founder of the General Electric Co., Ltd., of which he is chairman and managing director. He is an authority on international trade, and has served on a number of Government committees.

Major Robert George Archibald, C.M.G., D.S.O., M.D., R.A.M.C. (retd.), director of the Wellcome Tropical Research Laboratories, Sudan, received a knighthood.

Sir Thomas Robinson, O.B.E., J.P., until recently chairman of the Dyestuffs Advisory Licensing Committee under the Dyestuffs (Import Regulation) Act, and vice-chairman of the Bradford Dyers' Association, received a K.B.E.

Dr. Frederick Grant Banting, D.Sc., LL.D., M.D., M.R.C.S., L.R.C.P., of the Dominion of Canada, internationally famous as the discoverer of insulin, which is now so extensively used in the treatment of diabetes, also received a K.B.E. Dr. Banting, who is Professor of Medical Research at the University of Toronto, received the Nobel Prize in 1923, for his discovery of insulin.

Mr. John Crosthwaite Bridge, F.R.C.S.Ed., M.R.C.P.Ed., D.P.H., Senior Medical Inspector of Factories, Home Office, received a C.B.E.

Manufacture of Lithopone

Alleged Abuse of Monopoly Rights

IN the Chancery Division, on Wednesday, Mr. Justice Luxmore had before him an assigned petition under the Patent and Designs Acts, 1907-1932. The matter came before the Court by way of appeal from a decision of the Comptroller of Patents. Before the Comptroller, McKechnie Bros, Ltd., applied under Section 27 of the Patents Act with regard to Patent 225,523 dated November 20, 1923, granted to Fab. Vorm Frieda Bayer Co., of Germany, for an invention for improvements in the manufacture of lithopone, for a grant of compulsory licence under the patent for the endorsement of the patent "licence of right."

The petitioners now before the Court were the I.G. Co., of Germany, and Orr's Zinc White, Ltd., the I.G. being the legal owners of the patent and Orr's the licencees under the patent.

On December 6 last, the respondents, McKechnie Bros., applied to the Comptroller for the grant of a compulsory licence, alleging that there had been an abuse of monopoly rights under the letters patent on three points. In the first place they said that three years having elapsed since the date of the sealing of the letters patent, the patented invention, being one which was capable of being worked in the United Kingdom, was not being worked within the United Kingdom, on a commercial scale or at all. Secondly, they said that the working of the invention on a commercial scale was being prevented or hindered by reason of the fact that continuously since the date of the patent, large quantities of lithopone manufactured abroad and under the patented process had been and were being imported into and sold in the United Kingdom by the patentees or persons claiming under them or by persons directly or indirectly purchasing through them. In the third place the respondents alleged that by failure or refusal of the patentees to grant a licence or licences upon reasonable terms, the lithopone trade or industry in the United Kingdom was prejudiced and that it was in the public interest that licences should be granted.

Petitioners opposed the application and while they admitted that the grant of a licence by them to the respondents had been refused, they denied that there had been any abuse of monopoly rights and denied that the respondents were entitled to the grant of a compulsory licence or any relief. The application was heard by the Comptroller in January and February last and evidence was heard.

A Pigment of Light-Proof Quality

At the hearing the respondents contended that the invention was not being worked on a commercial scale in the United Kingdom. Petitioners admitted that the only working of the invention in the United Kingdom had been by Orr's licence, but contended that Orr's were working the invention on a commercial scale and that the respondents had failed to establish that such working did not exist at the date of their application. Petitioners admitted that lithopone made in accordance with the invention was being imported from abroad, but denied that such importation in any way prevented or hindered the working of the invention in the United Kingdom on a commercial scale. The respondents mainly contended that their trade and the trade in the letters patent in this country generally was prejudiced by reason of the fact that in the course of their business as copper smelters they produced by way of by-products zinc materials containing chlorides which they desired to use for the manufacture of lithopone, and that the patent covered an economical method of manufacturing light-proof lithopone, when using zinc materials containing chlorides. Petitioners contended that it had not been established that it was in the public interest that the licence of the respondents should be granted.

In February the Comptroller gave his decision by which he held that there had been an abuse of monopoly rights under the patent under each of the heads upon which the respondents relied. The Comptroller decided that the relief which he would give would be to grant a licence to the respondents, but he deferred making any order for a month to give the parties an opportunity of entering into negotiations for an agreement. No such agreement was arrived at and in March the Comptroller made an order that the petitioners the I.G. should grant a licence to the respondents under the letters patent in the form and upon the terms contained in the schedule or order.

The petitioners submitted that the decision and order were erroneous and should be reversed on the ground that there was no evidence that the petitioners had committed the breaches alleged.

Mr. Whitehead, K.C., Mr. Trevor Watson, K.C., Mr. Tooker and Mr. Walker appeared for the petitioners, and Sir Arthur Colefax, K.C., and Mr. Russell Clarke for the respondents.

Mr. Whitehead, in opening the case, said lithopone was used in connection with several industries. It was possible to make it nearly light-proof. There was no question as to the utility of the invention. The process used had been improved from time to time and the present patent was one of the improved patents. The plant necessary to manufacture lithopone costs between £50,000 and £60,000.

The hearing is proceeding.

Preservation of Books and Papers

Removal of Sulphur Dioxide from Library Air

EXPERIMENTS have shown that papers exposed to an atmosphere containing sulphur dioxide in an amount varying from 2 to 9 parts of sulphur dioxide per million parts of air for 10 days undergo pronounced physical and chemical deterioration, manifested by a large increase both in brittleness and acidity. A valuable study of a method of removing sulphur dioxide from the air entering the library has recently been published by the United States Bureau of Standards (Misc. Pub., No. 142, price 5 cents). Tests were made in the Folger Shakespeare Library, Washington. They show that the sulphur dioxide is not completely removed from the air by washing it with untreated water in an air-conditioning system. Effective elimination was obtained on washing the air with water that had been treated with alkaline material at a rate sufficient to maintain the hydrogen ion concentration of the wash water within the range 8.5 to 9. It was proved that the sulphur dioxide content of the washed air was entirely dependent upon the hydrogen ion concentration of the wash water. The composition of a specific mixture of chemicals commercially available was found to be very satisfactory. An air washer of the commercial type using untreated water does not remove enough of the sulphur dioxide from library air. The hydrogen ion concentration should not be allowed to rise above *pH* 9.0 owing to the danger of removing zinc from brass fittings.

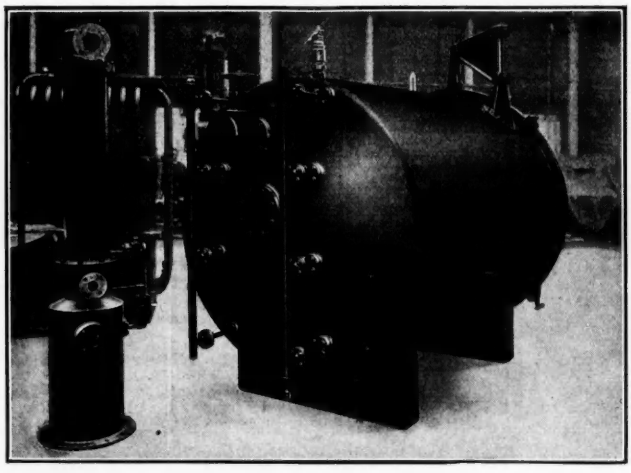
Chemical Lead

A Revised British Standard Specification

A REVISION of the Standard Specification No. 334 for Chemical Lead, has just been issued by the British Standards Institution. The specification was first issued in 1928, and as a result of the experience that has been gained by its adoption it was found that a number of amendments were desirable. These have been embodied in the revised specification. The use of lead to which alloying elements have been added has increased rapidly. The scope of the specification has, therefore, been extended to provide for two types of lead. Lead of type A corresponds to the quality of lead covered by the original specification; type B provides for lead to which alloying elements have been added. Additional requirements have also been included specifying the method in which the samples for analysis should be taken. All the tests have been carefully reviewed and a number of details have been modified so as to remove certain ambiguities and to make the methods of carrying out the tests clearer.

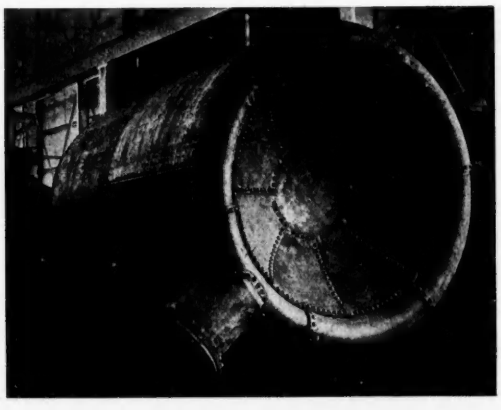
This specification in its revised form (No. 334-1934) should prove exceedingly useful to all chemical engineers and others who are interested in the use and application of lead in industry. Copies may be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 2d., post free.

Industrial Plant for Pressure and Vacuum Working



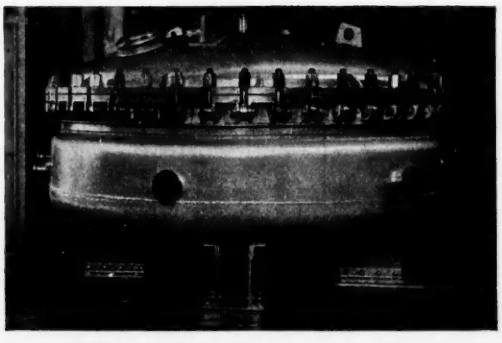
Special Equipment is made for the Drying and Impregnation of Wood under vacuum. These installations possess important advantages in view of the rapidity and regularity of the drying which is obtained. This illustration shows the rear of the drying and impregnating chamber, the opposite end being provided with a quick-closing door to admit the wood.

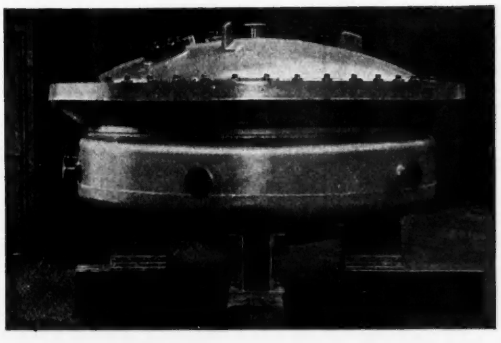
Vacuum Drying Chamber of the shelf type, suitable for the drying of chemicals, dyestuffs, extracts, adhesives, food products, etc.



Tar Still, 9 ft. inside diameter × 17 ft. 6 in. high, lying in a horizontal position. This still is constructed from steel plate, and the bottom is fitted to the cylindrical shell by means of a U-shaped channel ring.

Modern Steelplate Work needs facilities and plant of the latest type for making hydraulic pressings in a wide range of types and sizes, including dished and flanged ends of various diameters and thicknesses.





Jacketed Pressure and Vacuum Cable Impregnating Vessel. This vessel has an inside diameter of 7 ft. 5 in., with a depth of 3 ft. 9 in. The removable cover is operated by swing bolts. The working pressure in the steam jacket is 20 lb. per sq. in. ; that inside the pan is 35 lb. per sq. in. One illustration shows the swing bolts which secure the cover of the vessel ; the second illustration shows the seal in position around the flange.

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News from the Allied Industries

Non-Ferrous Metals.

THE OUTPUT OF FINE COPPER from Northern Rhodesia in April amounted to 12,949 tons. This compares with 9,434 tons in March and 7,786 tons in April, 1933. Output of cobalt was 157,794 lb. (against nil a year ago), of zinc 1,540 tons, and of gold 183 oz. (against 50 oz. a year ago).

Rubber

THE MONTHLY RUBBER CROP RETURNS issued by the Rubber Growers' Association show an increase for April, over the corresponding month of 1933, of 13.4 per cent. in the aggregate output of 520 companies. The aggregate output of 615 companies for the first four months is the highest recorded during the last six years.

THE DUTCH EAST INDIES PEOPLE'S COUNCIL has carried the rubber restriction scheme. The Government proposed a temporary export duty, but the Council, after long discussion, rejected this, accepting a system of individual restriction whereby natives and companies are granted exactly half each of the total quota of the rubber allowed for export. Notwithstanding this decision, the Government has the power to impose a temporary export duty if it likes to do so unless a system is found to control the individual rubber production, which in the short time left is hardly possible.

Artificial Silk

BRITISH RAYON PRODUCTION in April was 7,000,000 lb., against 8,400,000 lb. in March. The reduction is largely accounted for by the Easter holiday. The production in April last year was only 5,200,000 lb. The total output for the first four months of this year was 31,200,000 lb., against 23,200,000 lb. for the corresponding period of last year.

IT IS STATED THAT RECENT REPORTS regarding the plans of Courtaulds, Ltd., have been somewhat misleading and that the recent decision to equip a new factory near Flint has no connection with the suggested factory at Preston. The new Flintshire factory is exclusively for the production of staple fibre rayon which will be subsequently spun into yarn at the Arrow Mill, Rochdale, which was recently taken over by Courtaulds for the purpose. No decision regarding building operations has been taken at Preston and if and when the provisional plans are put in hand, much time must elapse before production begins.

Iron and Steel

THE INTERNATIONAL STEEL CARTEL at Brussels is said to be negotiating with the British steel interests with a view to their entry into the cartel. It is stated that the British metal concerns are about to form a special organisation to deal with their export sales, and that it would be this organisation which would enter the cartel. The executive committee is now establishing a section for fine tin sheets.

Whale Oil

IT HAS BEEN OFFICIALLY STATED in Oslo that the negotiations between one of the largest groups of the Norwegian whaling companies, namely, the group headed by M. Lars Christensen, of Sandjeford, and the other Norwegian whaling companies had failed. The negotiations, which had been begun upon the suggestion of the Premier, M. Mowinckel, aimed at an agreement among the companies following the contract made between the Christensen group and Unilever. Under the contract it was reported that Unilever had promised to buy the total production of whale oil of the Christensen group up to a maximum of 110,000 tons annually.

Paper

PRESIDING AT THE ANNUAL MEETING of Wiggins, Teape and Co. (1919), Ltd., in London, on May 25, Colonel Sir Wyndham R. Portal, chairman of the company, said that trading conditions in the export markets had again proved most difficult. It was not necessary to dwell upon the difficulties in the way of a revival of the export trade of this country. So much had been said of the restrictions brought about by exchanges, tariffs, and reduced purchasing power that he did not propose to enlarge upon that subject. It was evident that, before this country could enjoy real and lasting prosperity, some way of removing or overcoming the obstacles must be found. The company, in the past, had always enjoyed a good and profitable export trade, so the matter was of material importance to them. They had continued to direct attention to the policy of keeping their mills up to date by a judicious expenditure on new plant, not only with a view to securing improvement in the quality of the company's products, but to bring about reductions in the cost of manufacture.

Continental Chemical Notes

RECENT GERMAN WORK on carbohydrate additions to building materials indicates that 1 per cent. of molasses produced a marked improvement in the tensile strength of building lime ("Chemische Fabrik," May 16).

* * *

LUMINESCENCE CAN BE INDUCED in alkaline dimethyldiacridylium salt solutions with the aid of hydrogen peroxide, the effect being intensified by osmium tetroxide which functions as a catalyst. According to K. Gleu ("Chem.-Zeitung," May 30) this is probably the most sensitive of all known luminescence reactions.

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BLAST FURNACE SLAG forms an excellent raw material for clinkerless hydraulic cement after activation with calcium sulphate (according to P. P. Boudnikoff, in the May issue of "Chimie and Industrie"). Various forms of the sulphate are applicable, good results in the laboratory as well as under industrial conditions being obtained with natural or artificial anhydrite, as well as with dolomite previously calcined at 800° to 900° C., the activator being added in each case in the proportion of 5 to 7 per cent. The most effective activator, however, was stated to be a mixture of anhydrite and dolomite dust (or calcined dolomite). When immersed in ordinary water, the new type of cement began to set after 4 hours 20 minutes and was completely set after 9 hours.

SILVER DIFLUORIDE RENDERS GOOD SERVICE as a fluorine carrier for gaseous reactions. According to O. Ruff ("Chem.-Zeitung," June 2) it is readily prepared by passing fluorine over silver at red heat. On bringing into contact with water it reacts energetically with evolution of ozone containing oxygen. Another most interesting feature of silver difluoride is its pronounced paramagnetism.

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A CONSIDERABLE SYNTHETIC GEM INDUSTRY has grown up at Verneuil, France. Manufacture of the so-called synthetic precious stones of commerce is based upon fusion-crystallisation of pure fused alumina obtained by ignition of ammonia alum. The alum is calcined at 1,300° in quartz crucibles, a batch of which is treated simultaneously in muffle furnaces heated by heavy oil. A daily output of 15 to 20 kg. powdered alumina is attained with oil-fired muffles operated on the discontinuous Mouratille system. Each stone is produced by progressive fusion of a certain amount of alumina in an oxy-blowpipe flame. The equipment for this operation comprises a metal container for the powder, a blowpipe, an enclosure of refractory material where the powder both undergoes fusion and crystallises in the heart of the flame, and a support (likewise of refractory material) for the growing crystal ("Chimie et Industrie," May, 1934).

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THERE has been a fair amount of activity in the chemical market this week. In the industrial chemicals section acetone, formic and oxalic acids have been in good demand. Business in acetic acid, anhydrous ammonia, ammonium chloride and saltcake has been on a fair scale and there has been a better inquiry for salammoniac. Trade in wood distillation products is on quite a good scale and quotations are unchanged. The coal tar products market has been quite active, creosote oil still receiving most attention. Little interest has been shown in heavy solvent naphtha or xylol, and the demand for solvent naphtha has fallen off. The demand for cresylic acid continues to increase, and there is more inquiry for coal tar pitch. The best inquiry in pharmaceutical chemicals has been for aspirin, bromides, cream of tartar, hexamine, hydroquinone, sodium benzoate and tartaric acid. There is now a steady demand for salicylates. Although business is chiefly for small quantities there has been an improvement in the essential oils market.

LONDON.—A fair volume of business is being received with the markets mainly steady. As indicated in the list of prices for general chemicals in THE CHEMICAL AGE last week, prices for borax and boric acid have been reduced by £1 per ton from June 1. The coal tar products market remains steady, and prices show no change from last week.

MANCHESTER.—The chemical market in this area during the week seems to have got more into its stride after the Whitsun disturbance, and, on the whole, the demand, especially for deliveries against contracts, in the aggregate is now about back to the pre-holiday level. Up to the present, there has been no important awakening of interest in contract renewals and these are not expected on any material scale until about the end of he current month. This week's fresh commitments have been comparatively few and mostly in respect of moderate lots. The alkali products and the heavy acids, as well as some of the potash materials, have been moving fairly steadily into consumption. Taking the market generally, prices keep up well and if there is little indication of rising values in any section there are certainly few cases of weakness. Most of the by-products have been maintained although the tendency in solvent naphtha and one or two other lines appears still to be rather easy.

SCOTLAND.—The Scottish heavy chemical market has been distinctly quiet over the past week and little or no bulk inquiries are being received.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9½d.

ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £43 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £48 10s. to £53 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 1s. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s. 0¾d.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £21 ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BARYTES.—£7 to £8 10s. per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—2s. 7d. to 2s. 11d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3¾d. to 5d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb. Liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 2s. 6d. per cwt.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £27 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34; brown, £31.

LEAD, NITRATE.—£28 per ton. MANCHESTER: £27 10s.

LEAD, RED.—SCOTLAND: £25 10s. to £28 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £37 10s.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—8½d. to 9d. per lb. without engagement.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £36 10s.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99½/100%, powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6¼d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9½d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8¾d.; B.P., 9d. to 9¾d.

POTASSIUM PRUSSIATE.—LONDON: 8¼d. to 8¾d. per lb. SCOTLAND: Yellow spot material, 8¼d. ex store. MANCHESTER: Yellow, 8¼d.

RUPRON (MINERAL RUBBER).—£16 10s. per ton.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 15s. per ton f.o.r. in bags.
SODA, CAUSTIC.—Solid 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE.—£22 per ton. LONDON: £23.
SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.
SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. net for spot lots and 4d. per lb. with discounts for contract quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. net.
SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.
SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.
SODIUM CHLORATE.—£32 per ton.
SODIUM CHROMATE.—4d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
SODIUM META SILICATE.—£16 per ton, d/d U.K. in cwt. bags.
SODIUM NITRITE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£12 10s. per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.
SODIUM SILICATE.—140° Tw. Spot £8 per ton d/d station, returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £14 10s. per ton f.o.b.
SULPHUR.—£10 15s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.
ZINC SULPHIDE.—11d. to 1s. per lb.

Pharmaceutical and Fine Chemicals

The following changes in the prices of pharmaceutical, photographic and perfumery chemicals are announced:—
ACID, BORIC, B.P.—Cryst, £34 10s. per ton; powder, £35 10s.
BISMUTH SALTS.—Carbonate, 6s. 10d. per lb.: citrate, 9d. 9d.; nitrate (cryst.), 4s. 9d.; oxide, 11s.; salicylate, 8s.; subchloride, 10s. 9d.; subgallate, 7s. 8d.; subnitrate, 6s
BORAX, B.P.—Crystal, £23 10s. per ton; powder, £24.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8½d. to 9d. per lb.; crude, 60's, 2s. 11d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 7¾d. to 8d. per lb.; crude, 2s. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.
ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale, 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.
ANTHRACENE OIL.—Strained, 4½d. per gal.
BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor, 1s. 4d. to 1s. 4½d.; 90%, 1s. 4½d. to 1s. 5½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d.
CREOSOTE.—B.S.I. Specification standard, 3¾d. to 4d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3d. f.o.r. North; 4d. London. MANCHESTER: 3½d. to 4½d. SCOTLAND: Specification oils, 4d.; washed oil, 4½d. to 4¾d.; light, 4½d.; heavy, 4¼d. to 4½d.
NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d. to 1s. 8d.; 99/%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
NAPHTHALENE.—Purified crystals, £9 15s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.
PITCH.—LONDON: £2 19s. to £3 1s. per ton f.o.b. East Coast port for next season's delivery.
PYRIDINE.—90/140, 6s. 6d. to 7s. per gal.
TOLUOL.—90%, 2s. 3d. per gal.; pure, 2s. 6d.
XYLOL.—Commercial, 2s. 2d. per gal.; pure, 2s. 4d.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9¼d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID NAPHTHIONIC.—1s. 8d. per lb.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
BENZIDINE, HCL.—2s. 5d. per lb.
p-CRESOL 34-5° C.—2s. per lb. in ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROCHLORBENZENE, SOLID.—£72 per ton.
DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 10½d.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot. £78 15s. per ton in paper bags; £79 5s. in casks, in 1-ton lots.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—3s. 11d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE P.G.—1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—9½d. per lb.
p-TOLUIDINE.—1s. 11d. per lb.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 to £10. Grey, £15 to £16. Liquor, brown, 30° Tw., 7d. to 9d. per gal. MANCHESTER: Brown, £12 10s.; grey, £17 10s.
ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£5 10s. to £9 10s. per ton.
WOOD CREOSOTE.—Unrefined, 6d. to 9d. per gal.
WOOD NAPHTHA, MISCIBLE.—2s. 6d. to 3s. 3d. jer gal. Solvent, 3s. 9d. to 4s. 6d. per gal.
WOOD TAR.—£2 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Home: £7 5s. per ton delivered in 6-ton lots to farmer's nearest station. Export: Nominal £5 17s. 6d. per ton f.o.b. U.K. ports in single bags.
CYANAMIDE.—£7 5s. per ton carriage paid to any railway station in Great Britain in lots of 4 tons and over.
NITRATE OF SODA.—£7 18s. 6d. per ton delivered in 6-ton lots to farmer's nearest station.
NITRO-CHALK.—£7 5s. per ton delivered in 6-ton lots to farmer's nearest station.
CONCENTRATED COMPLETE FERTILISERS.—£10 15s. to £11 6s. per ton according to percentage of constituents.
NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton according to percentage of constieuents.

Latest Oil Prices

LONDON, June 6.—LINSEED OIL was firm. Spot, £24 (small quantities 30s. extra); June, £22 12s. 6d.; July-Aug., £23; Sept.-Dec., and Jan.-April, £23 5s., naked. RAPE OIL was quiet. Crude extracted, £28; technical refined, £29 10s., naked, ex wharf. COTTON OIL was steady. Egyptian crude, £13 10s.; refined common edible, £16 15s.; and deodorised £18 5s., naked, ex mill (small lots 30s. extra). TURPENTINE was quiet. American, spot, 47s. 3d. per cwt.

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Complete Specifications Open to Public Inspection

FOODSTUFFS comprising phosphatide, production.—Hanseatische Mühlenwerke A.-G. Nov. 26, 1932. 27475/33.

SULPHUR LUBRICANTS.—Sulflo Corporation of America. Nov. 26, 1932. 31380/33.

POLYMERISATION PRODUCTS, manufacture and production.—I. G. Farbenindustrie. Nov. 25, 1932. 31605/33.

FIREPROOF MATERIAL, manufacture.—I. G. Farbenindustrie. Nov. 22, 1932. 32500/33.

PROTECTING MEDICAMENTS from the action of stomach-juices.—I. G. Farbenindustrie. Nov. 23, 1932. 32638/33.

HIGHLY PLASTIC COLLOIDAL TUNGSTEN compounds, process for the production.—A. Pacz. Nov. 24, 1932. 32768/33.

ORGANIC CONDENSATION PRODUCTS, manufacture.—E. I. du Pont de Nemours and Co. Nov. 25, 1932. 32911/33.

KETONES, manufacture.—E. I. du Pont de Nemours and Co. Nov. 25, 1932. 32912/33.

ANIMAL OR CELLULOSIC FIBRES, *printing*.—Soc. of Chemical Industry in Basle. Nov. 24, 1932. 32916/33.

CONDENSATION PRODUCTS from urea, formaldehyde, and hexamethylenetetramine or compounds acting similarly to hexamethylenetetramine. Nov. 25, 1932. 33028/33.

TEXTILE ASSISTANTS, manufacture.—Soc. of Chemical Industry in Basle. Nov. 26, 1932. 33175/33.

MONOAZO DYESTUFFS insoluble in water, manufacture.—J. R. Geigy, A.-G. Nov. 28, 1932. 33311/33.

Specifications Accepted with Dates of Application

MOULDING COMPOSITIONS.—H. E. Potts (Shawinigan Chemicals Ltd.). Aug. 12, 1932. 410,770.

SYNTHETIC RESINS and processes for making the same.—Mantle Lamp Co. of America. Aug. 20, 1931. 410,837.

PLASTIC CELLULOSIC COMPOSITIONS, method of preparing.—O. R. Schultz. Aug. 27, 1931. 410,738.

CATALYSTS.—J. G. King and M. A. Matthews. Sept. 19, 1932. 410,771.

TREATMENT OF HYDROCARBONS, process and apparatus.—W. W. Triggs (Gas Fuel Corporation). Oct. 18, 1932. 410,773.

CONVERSION of high boiling point hydrocarbons into lower boiling point hydrocarbons.—M. A. Marconi. Oct. 19, 1932. 410,741.

POTASSIUM NITRATE, production.—Kali-Forschungs-Anstalt Ges. Jan. 28, 1932. 410,774.

ISOLATION OF PIPERITONE.—Howards and Sons, Ltd., J. W. Blagden and W. E. Huggett. Oct. 25, 1932. 410,813.

COLOURING MATTERS from *o*-arylene *dic*yanides, manufacture.—I. M. Heilbron, F. Irving, R. P. Linstead, J. F. Thorpe, and Imperial Chemical Industries, Ltd. Nov. 16, 1932. 410,814.

PURIFYING GLYCERINE DISTILLATES obtained from fermentation liquors, process.—E. I. du Pont de Nemours and Co., W. H. Carothers, J. W. Hill, and F. J. L. Van Natta. Nov. 17, 1932. 410,782.

AZO DYESTUFFS, manufacture.—Imperial Chemical Industries, Ltd., and A. H. Knight. Nov. 17, 1932. 410,843.

HYDRATION PRODUCTS of olefines, manufacture.—H. Dreyfus. Nov. 18, 1932. 410,816.

COMPOSITE TITANIUM PIGMENTS.—Titanium Pigment Co., Inc. Nov. 19, 1931. 40,749.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. Feb. 15, 1932. 410,765.

REMOVING AND RECOVERING acidic gases from gas mixtures containing said acidic gases, processes.—Girdler Corporation.—Nov. 23, 1931. 410,848.

MIXED ESTERS.—Carbide and Carbon Chemicals Corporation. Dec. 10, 1931. 410,797.

DRYING BY HEATED GASES.—Chemical and Metallurgical Corporation, Ltd., and J. W. Crabtree. Nov. 23, 1932. 410,798.

CELLULOSE DERIVATIVE COMPOSITIONS, manufacture.—E. I. du Pont de Nemours and Co. Nov. 28, 1931. 410,827.

POTASSIUM SULPHATE, production.—J. A. Lanyon, I. L. Clifford, A. E. Cashmore, and Imperial Chemical Industries, Ltd. Nov. 25, 1932. 410,830.

HYDROXYNAPHTHOTRIAZOLES, manufacture.—I. G. Farbenindustrie. April 20, 1932. 410,857.

NON-KNOCKING MOTOR FUELS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Dec. 2, 1932. 410,874.

UNVULCANISED INDIARUBBER in granular form, preparation.—Rubber Growers' Association, Inc., G. Martin, W. S. Davey, and J. E. Townley. Dec. 2, 1932. 410,875.

PETROLEUM COKE, manufacture.—W. Duff. Dec. 7, 1932. 410,881.

DRYING OF TUBULAR SKINS of regenerated cellulose.—Courtaulds Ltd., and C. F. Topham. Feb. 18, 1933. 410,930.

POTASSIUM OXALATE from potassium formate, process for making.—Dr. E. Hene. May 30, 1932. 410,971.

SINTERED BODIES from metallic oxides, production.—Siemens and Halske A.-G. July 15, 1932. 410,988.

TREATMENT OF MASH and the manufacture of distillates therefrom.—Zellstofffabrik Waldhof and W. Claus. Sept. 14, 1932. 410,989.

AMINO ACIDS from materials containing keratin, production.—C. F. Ferstl. Sept. 29, 1933. 411,009.

CATALYTIC AND CONTACT CHAMBERS for the purification of vapours. O. D. Lucas, E. J. Lush and Yorkshire Tar Distillers, Ltd. Nov. 22, 1932. 410,769.

ADHESIVES for artificial masses.—I. G. Farbenindustrie. Dec. 30, 1932. 411,058.

HYDROCARBON PRODUCTS and process for the manufacture and production of the same.—J. Y. Johnson (I. G. Farbenindustrie). Aug. 17, 1932. 410,833.

PROCESS FOR INHIBITING the formation of undesirable colour in animal or vegetable oils or fats and the oils or fats produced thereby.—Mantle Lamp Co. of America.—Aug. 20, 1931. 410,834.

Applications for Patents

AMINES, manufacture.—I. G. Farbenindustrie. May 15. (Germany, May 18, '33.) 14632.

CARBOCYANINE DYESTUFFS, manufacture.—I. G. Farbenindustrie. May 16. (Germany, May 16, '33.) 14797.

ACID DYESTUFFS, manufacture.—I. G. Farbenindustrie. May 16. (Germany, May 17, '33.) 14798.

APPARATUS for estimation of oxygen in gas mixtures.—Imperial Chemical Industries, Ltd. May 10. 14213.

COLOUR RESISTS on textile materials.—Imperial Chemical Industries, Ltd. May 11. 14342.

REFINING CRUDE FATS, etc.—Imperial Chemical Industries, Ltd. May 11. 14345.

APPARATUS for determining quantitative composition of gases. Imperial Chemical Industries, Ltd. May 14. 14586.

WET PURIFICATION of flue gases.—Imperial Chemical Industries, Ltd. May 15. 14704.

SALTS, production.—Norsk Hydro-Elektrisk Kvaelstofaktiesels-kab. May 15. (Norway, June 22, '33.) 14667.

TREATING HEAVY HYDROCARBON OILS.—A. J. Paris. May 11. (Aug. 22, '33.) (United States, Sept. 2, '32.) 14340.

CALCIUM NITRATE, production.—E. Potter and Montecatini Soc. Generale per l'Industria Mineraria ed Agricola. May 16. 14827.

BENZIDINE, etc., from azo derivatives, etc.—E. H. Reichenberg and S. W. Reichenberg. May 12. 14426.

SUBSTITUTED AMIDES of aliphatic acids, manufacture.—Soc. of Chemical Industry in Basle. May 15. 14655.

INDURATED FIBRE, manufacture.—Soc. of Chemical Industry in Basle. May 14. (United States, May 12, '33.) 14562.

INDURATED FIBRE, manufacture.—Soc. of Chemical Industry in Basle. May 14. (United States, Oct. 30, '33.) 14562.

ALKYLATED CYCLIC AMIDINES, manufacture.—Soc. of Chemical Industry in Basle. May 16. (Switzerland, May 18, '33.) 14799.

POLYMERISATION PRODUCTS, manufacture.—Standard Oil Development Co. May 10. (United States, June 6, '33.) 14134.

TREATMENT OF TARS.—Thermal Industrial and Chemical (T.I.C.) Research Co. Ltd. May 10. 14137.

TITANATES from titanium ores, manufacture.—Dr. A. Wacker Ges. für Elektrochemische Industrie Ges. May 15. (Germany, May 15, '33.) 14657.

CONVERTING CARBON MONOXIDE into formic acid, etc.—C. Ammon. May 18. 15117.

AZO DYESTUFFS, manufacture.—M. J. G. Bader. May 22. (France, May 20, '33.) 15323.

AGENTS for combating insects, manufacture.—A. Carpmael (I. G. Farbenindustrie). May 23. 15429.

AZO DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). May 23. 15430.

EXPLOSIVES, manufacture.—Les Petits Fils de F. De Wendel et Cie. May 17. (France, June 17, '33.) 14907.

WHITE LEAD, manufacture.—F. Dietzsch, S. J. Hogg, A. R. Lucas, and W. G. Wagner. May 17. 14905.

VIOLANTHRONE DERIVATIVES, manufacture.—E. I. du Pont de Nemours and Co. May 17. (United States, June 1, '33.) 14939.

MORPHOLINE DERIVATIVES, manufacture.—E. I. du Pont de Nemours and Co. May 18. (United States, May 18, '33.) 15086.

Company News

W. J. Bush & Co.—The net profit for the year 1933 was £70,391, against £58,970 in the previous year. A final dividend on the ordinary shares of 7 per cent. is proposed, making 11 per cent. for the year. To general reserve is placed £25,000, and £22,000 is written off goodwill, carrying forward £91,928.

Yorkshire Dyeware and Chemical Co.—The report for the year to March 31, 1934, shows a net profit of £20,034, against £19,908 in 1932-33. The directors recommend a final dividend of 7½ per cent., making 10 per cent. for the year, and a bonus of 2½ per cent., less tax, leaving to be carried forward £7,331.

The Vereinigte Glanzstoff-Fabrieken A.G.—The company reports a gross profit of Rm.7,554,672 for 1933 and a net profit of Rm.24,331. For 1932 a loss of Rm.5,491,412 was registered, and as Rm.9,808,163 had to be provided for amounts written off, the total loss was met by taking Rm.20,000,000 from reserves, which thus were exhausted.

Cape Asbestos Co.—The accounts for the year 1933 show a net profit of £21,878, against £14,388 in 1932. To employe's fund has been allocated £3,000; to reserve £5,000, and the directors recommend a dividend of 6 per cent. on the ordinary shares, a full dividend on the preference shares at a similar rate, carrying forward £10,478.

United Drug, Inc.—The directors report a net profit on sales for three months ended March 31 of $1,073,752, and income from investments and interest of $43,821, making $1,117,574. Interest on funded debt absorbs $482,984, provision for taxes, $77,751, while loss from operation of leases acquired by United Drug Co., as guarantor, from Louis K. Liggett Co., bankrupt, is $120,460. The net profit is therefore $436,378, representing 31 cents per share on issued stock. Reserves have increased from $1,036,000 to over $3,000,000.

Boots Pure Drug Co.—The report for the year to March 31 last shows that the net trading profit and investment income rose from £832,158 to £943,075. The transfer from works development reserve to revenue is reduced from £35,642 to £4,667, and total income is shown at £949,940, against £868,269. The net balance is up from £701,453 to £744,866; the ordinary distribution is maintained at 29 per cent., and ordinary holders are offered one new share at 15s. for every 15 now held. The necessary resolution to increase the capital to £3,000,000 by the issue of 400,000 new ordinary 5s. shares will be submitted at the annual meeting, and the formal offer will follow immediately. General reserve receives £150,000—against £100,000—and property reserve, £16,018, but no transfer is made to works development reserve, compared with £100,000 a year ago. General reserve now stands at £1,650,000 and works development fund at £103,712.

New Companies Registered

Cassel Chemical Products, Ltd.—Registered May 17. Nominal capital £30,000. To carry on the business of producers, manufacturers and importers and exporters of and dealers in chemicals, drugs, minerals, metals, pharmaceutical, medicinal, industrial and other products, preparations and articles, oils, paints, pigments and varnishes, paint and colour grinders, drysalters, oil and colourmen, etc. Directors: Heinz W. Cassel, 97 Gloucester Terrace, W.2, Curt Cassel.

Dytex Sales, Ltd.—Registered May 31. Nominal capital £500. To adopt an agreement with Tintex Dyes, Ltd., and Pastex Dyes, Ltd., and to carry on the business of dealers in and manufacturers of dyes and chemicals of all kinds, importers and manufacturers of and dealers in pharmaceutical, medicinal, chemical, industrial and other preparations, etc. A subscriber: Herbert C. Wisenden, 114 Hillside Gardens, High Barnet, Herts.

Metallic Pigments, Ltd.—Registered May 30. Nominal capital £5,000. Manufacturers of, agents for and dealers in pigments, paints, varnishes, colouring materials, oils, dyes, ores, metals, minerals, alkaline substances, chemicals, chemical products and compounds, fertilisers and fertilising products, vegetable products, conductors or promoters of chemical or metallurgical researches, analysts, assayers, etc. A subscriber: C. H. Scott, 18 Austin Friars, E.C.2.

Rozolite Manufacturing Company, Ltd.—Registered May 23. Nominal capital £5,000. Manufacturing chemists, manufacturers of and dealers in all chemicals, gases, drugs, medicine, disinfectants, etc. A subscriber: John W. Battersby, 5 Fernhurst Gardens, Edgware, Middlesex.

Stockton Chemical Engineers and Riley Boilers, Ltd.—Registered May 30. Nominal capital £5,000. To take on lease the offices, workshops, plant, machinery and premises known as the Perseverance Boiler Works, Stockton-on-Tees, recently in the occupation of Riley Bros. (Boilermakers), Ltd., and to carry on the business of makers of boilers, tanks, girders and other engineering and mechanical plant, machinery and appliances, chemical engineers, etc. A director: Adolphus A. B. Walford, Stockton-on-Tees.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—H.M. Trade Commissioner at Calcutta reports that the Indian Stores Department is calling for tenders, to be presented in India by June 14, 1934, for the supply and delivery of two sets of horizontal-type centrifugal pumps, direct coupled to low-starting current or high-starting torque, squirrel cage drip-proof motors. Alternatively two pumping sets as above, but vertical type complete with shaft extension couplings, starters, float switch, accessories and spares. (Ref. G.Y. 13885.)

Jamaica.—A commission agent in Kingston, Jamaica, wishes to obtain the representation, on a commission basis, of a United Kingdom drug house able to supply drugs and druggists' sundries. (Ref. No. 566.)

Canada.—A manufacturers' agent at Toronto desires to obtain United Kingdom agencies for plastic mouldings and novelties, on a commission basis, in the Provinces of Ontario and Quebec. (Ref. No. 569.)

Argentina.—A firm of agents in Buenos Aires wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of rubber yarns, football bladders, industrial chemicals, glues, gelatines, sulphurs and vulcanised fibre. A representative of the firm expects to arrive in this country on or about June 7. (Ref. No. 577.)

Forthcoming Events

June 12.—British Science Guild. Annual general meeting. "Friction." Professor E. N. da C. Andrade. 4 p.m. Royal Society of Arts, John Street, Adelphi, London.

June 13.—Electrodepositors' Technical Society. "Electricity and the Plater." J. W. Perring. 8.15 p.m. Northampton Polytechnic Institute, St. John Street, Clerkenwell, London.

June 16.—Society of Chemical Industry (Yorkshire Section). Joint visit with Hull Chemical and Engineering Society to the Experimental Farm of the Yorkshire Council for Agricultural Education. 3 p.m.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to June 16, 1934.

Dec. 547,021. Class 1. A liquid hydrocarbon, being a chemical substance for use in manufactures. I. C. I. (Fertilizer & Synthetic Products), Ltd., Imperial Chemical House, Millbank, London, S.W.1. December 13, 1933.

Methic. 547,500. Class 4. Dyes and dyestuffs, not mineral and not for toilet purposes. British Dyestuffs Corporation, Ltd., Imperial Chemical House, Millbank, London, S.W.1. January 8, 1934.

Opposition to the registration of the following trade marks can be lodged up to June 23, 1934.

Hydros. B543,803. Class 1. Hydrosulphite of soda for use as a reducing and stripping agent employed in the textile industry. Brotherton and Co., Ltd., City Chambers, Infirmary Street, Leeds. August 16, 1933.

Opposition to the registration of the following trade marks can be lodged up to June 30,1934.

Staral. 548,722. Class 1. Chemical substances for use in the treatment of textile fabrics and leather in the course of their manufacture. H. Th. Böhme Aktiengesellschaft, 20 Moritzstrasse, Chemnitz, Saxony, Germany. February 16, 1934.

Dextona. 549,572. Class 1. Paints, varnishes, enamels (in the nature of paints) and anti-corrosive oils. W. & J. Leigh, Ltd., Jubilee Buildings, 71 Bark Street, Bolton. March 16, 1934.

Lomix. 548,734. Class 4. Bituminous emulsions for use in manufactures. British Bitumen Emulsions, Ltd., Quadrant House, 55 to 58 Pall Mall, London, S.W. February 16, 1934.

Minbee. 550,236. Class 4. Waxes for use in manufactures. Meade-King, Robinson & Co., Ltd., Tower Building, Water Street, Liverpool. April 11, 1934.

Opposition to the registration of the following trade marks can be lodged up to July 6, 1934.

Bedesol. 548,759. Class 1. Artificial resins for use in the manufacture of paints, varnishes and the like. British Dyestuffs Corporation, Ltd., Imperial Chemical House, Millbank, London, S.W.1. February 17, 1934.

Tetranap. 549,874. Class 1. A liquid hydrocarbon, being a chemical substance used in manufactures. I.C.I. (Fertilizer and Synthetic Products), Ltd., Imperial Chemical House, Millbank, London, S.W.1. March 27, 1934.

From Week to Week

A MODERN PACKING EXHIBITION was opened by Lord Leverhulme, at Dorland House, Regent Street, London, on May 30.

DR. W. H. HATFIELD, Mr. J. Wortley Fawcett and Mr. Arthur Matthews, officials of Thos. Firth and John Brown, Ltd., Sheffield, have been appointed directors.

LORD SHAUGHNESSY, president of the Canadian Industrial Alcohol Co., is reported to have announced his resignation from the presidency and directorate of the company and its associated concerns. Mr. L. V. Wright, vice-president and general manager, will act as president, pending a permanent appointment.

A DEPUTATION FROM THE IRON AND STEEL INSTITUTE waited upon H.M. the King at Buckingham Palace, May 30, to present the Bessemer Gold Medal. King George is the third successive reigning sovereign to receive the medal, which is normally awarded only to distinguished benefactors of the Iron and Steel Industry.

A NEW POST OFFICE SERVICE came into force on June 1. It is the Postage Forward Parcels Service, and it meets a long-felt want of many firms who have an extensive mail trade. A firm must take out a licence, the minimum fee being £2 and in return they receive labels, printed in black on white paper, up to the amount of their deposit. These are sent to the customer, who sticks them on to the parcel he wishes to send to the firm. In addition to the ordinary postage, an extra halfpenny is charged.

PAST AND PRESENT MEMBERS of the staff and students of the Department of Chemistry, University of Manchester, have presented to the University a portrait of the late Mr. A. F. Edwards, who was steward to the Chemistry Department from 1888 to 1932. They have also contributed to a fund which has been invested to endow a prize to be known as the "A. F. Edwards Memorial Prize." This prize will be awarded each year to the student taking the first-year course in the Honours School of Chemistry who shows the greatest manipulative skill during the work of that year.

THE NOMINAL CAPITAL of Jackson Brothers (of Knottingley), Ltd., glass bottle manufacturers, etc., Headland Glass Works, Knottingley, Yorks, has been increased by the addition of £144,000 beyond the registered capital of £31,000. The additional capital is divided into 75,000 6½ per cent. cumulative preference shares of £1, and 276,000 ordinary shares of 5s. each. The 7,000 cumulative preference, 5,000 preferred ordinary and 19,000 ordinary shares of £1 each in the original capital have all been converted and subdivided into 124,000 ordinary shares of 5s. each.

LONDON IS EXPECTED to attract greater numbers of visitors this summer than ever before, from the rest of Britain and from overseas. In readiness for their arrival the Automobile Association has produced for the first time an A.A. London Guide. The ritual of "Seeing the Sights" has been simplified as far as possible, and the A.A. Guide contains a wealth of information covering a great variety of interests. The booklet is built round a general descriptive article suggesting convenient excursions, chiefly afoot. Street maps of the City and West End are supplemented with a cross-referenced list of principal streets.

FOLLOWING THE GOVERNMENT ANNOUNCEMENT continuing the import duties on iron and steel "without any limit of period," the British (Guest, Keen, Baldwins) Iron and Steel Co., Ltd., will shortly place big contracts for the development of its Cardiff-Dowlais steel works at a cost of about £2,000,000. This development has been foreshadowed for some time, but all was dependent on the Government Order, which has created a feeling of optimism through the iron and steel industry. In connection with the new works it is planned to manufacture 300,000 tons of billets and sheet bars per annum. Work will be provided for 1,500 men, in addition to increased numbers indirectly at the mines, the docks and railways, the limestone quarries, the iron-ore mines and the generating station.

UNDER AN ADDITIONAL IMPORT DUTIES ORDER issued by the Treasury on the recommendation of the Import Duties Advisory Committee, substantial changes have been made in the Customs duties on glass and glassware. The effect of the order is to substitute the following rates of duty for the rates previously existing in respect of the classes of glass and glassware specified: glass rod and tubing, 20 per cent.; unworked pressed or moulded lenses, prisms, and blanks thereof, 20 per cent.; bottles and jars other than syphon vases, tubular containers whether corked, capped, or not, stoppers and covers for bottles and jars whether ground or not, 25 per cent.; vacuum flasks, vacuum jars, and similar vacuum vessels, whether fitted or not, 30 per cent. The committee state in their report that although the additional duties imposed in 1932 on glass and glassware as the result of their first recommendation have not been without effect, imports as a whole are still substantial and have recently shown a tendency to increase, while in many directions the productive capacity in this country is not fully used. The committee are satisfied that very low price foreign competition is a real obstacle to further expansion, and that some additional protection is called for in most branches of the industry.

THE RESEARCH LABORATORIES of the Callenders Cable and Construction Co., Ltd., 38 Wood Lane, Shepherd's Bush, London, W.12, will be opened by Lord Rutherford on Friday, June 22.

MR. W. H. BARRITT, chairman of the Allied Association of Bleachers, Dyers, Printers, and Finishers, Manchester, is one of the technical advisers to the British employers' delegation to the International Labour Conference which opened at Geneva, on June 4.

MR. E. W. FELL, M.Sc. (Birmingham), Dr. Ing. (Aachen) has been appointed assistant lecturer in metallurgy at the University of Manchester. Mr. D. G. Evans, B.Sc. (Manchester), has been appointed demonstrator in chemistry in the department of bacteriology and preventive medicine.

THE 1934 EDITION OF THE "CHEMICAL MANUFACTURERS' DIRECTORY" has now been published, price 4s. 6d. This directory is now in its 66th edition. It covers England, Wales and Scotland, with some of the firms in Ireland. No attempt is made to embrace every product which is manufactured at the various works concerned, but all products of commercial importance are included.

MR. C. J. GOODWIN, consulting chemical engineer, sailed in the "Ile de France," on Wednesday, for New York and other parts of the United States, on a business trip. He expects to be in America for about a month. Letters addressed to him at the Chemists' Club, or the Waldorf Astoria Hotel, New York, will reach him.

"OFFICIAL CHEMICAL APPOINTMENTS," compiled by direction of the Council of the Institute of Chemistry, has now reached its eighth edition. This directory comprises 389 pages, of which the index of names occupies 58 pages. Its object is to provide a list of official appointments which are or may be held by chemists. In addition to strictly chemical appointments, mention is made of many positions connected with agriculture, metallurgy, bacteriology and other branches of work in which chemical knowledge and skill are necessary or useful.

THE LONDON CONFERENCE of the International Union for the Protection of Industrial Property concluded on June 2, with the signature of the general convention. The conference has not been able to carry unanimously the proposal relating to false indications of origin, but other important matters have been agreed to. These include the abolition of the reservation of the rights of third parties, further restrictions on the revocation of patents, and recognition of the independence of the protection of trade marks registered in another country after proper registration in the country of origin.

PROFESSOR B. K. SINGH'S presidential address to the Indian Chemical Society ("Journal of the Indian Chemical Society," vol. 10, No. 1), deals with "Optics in the Service of Chemistry," and includes a review of recent work on optical rotatory power and rotatory dispersion, to which he has himself contributed. He also records in a tabular form the growth of the Indian Chemical Society during the nine years of its existence. The Society now includes 360 fellows and 100 subscribers, and is publishing approximately 100 papers in each year, of which 750 pages are printed free of cost by the University of Calcutta.

SIGNOR ENRICO FERMI claims to have discovered a new element of atomic number 93, and therefore the most complex element known. The new element was produced when uranium, of atomic number 92, was bombarded with neutrons. The new element is radioactive and is stated to be extremely unstable—half its atoms changing their nature within about 13 minutes. Professor Corbino, writing of this discovery in the "Giornale d'Italia," observes that the artificial radioactivity recently discovered by M. Joliot and M. Curie in Paris, and realised upon a relatively large scale by Signor Fermi, is the manifestation of a rejuvenation of old stabilised matter brought about by a nuclear clash. He considers that the scientific possibilities opened up by this latest discovery are of incalculable importance. Professor Fermi, who is 33, was educated at Pisa University and is now professor of physics at Rome University and a member of the Royal Italian Academy.

IN THE ARTICLE on corrosion-resisting alloys, which appears on page 35 (Metallurgical Section) of THE CHEMICAL AGE of June 2, reference is made to the alloy cast iron known as "Nimol" and the name of Monel Weir, Ltd., is given as the makers of this material. Henry Wiggin and Co., Ltd., point out that "Nimol" is one of a number of trade names referring to a group of alloys which consists essentially of cast iron alloyed with Monel metal with additions of such elements as chromium, and is manufactured under licence by a number of different foundries. Alloy ingots known as N.C.C. (nickel-copper-chromium) pig, which contain the special elements in the required proportion, are now supplied by Henry Wiggin and Co., Ltd., who have acquired the business of Monel Weir, Ltd. Useful information on "Ni-Resist" is contained in a publication issued by the Mond Nickel Co., Ltd., under the title "The Manufacture and Physical Properties of Nickel-Copper-Chromium-Austenitic Cast Irons" which is available free of charge.

A SPECIFICATION FOR INSULATING BOARDS and tubes made from paper or paper pulp treated with synthetic resin and bonded together under the influence of heat and pressure was issued in 1929 as British Standard Specification No. 316. That specification was, however, limited to Grade II material, which is suitable for use on oil-immersed apparatus and on low-voltage apparatus working in air in dry situations. For certain purposes, such as the insulation of apparatus working in humid atmospheres, and for the producton of components by machining operations, a different grade of the same class of material is required, and this (higher) grade is now covered by the recently-issued British Standard Specification No. 547, of 1934, for Grade I synthetic-resin bonded-paper sheets for electrical purposes. Grade I material is distinguished from Grade II material by low water absorption, high resistivity, low dielectric loss and good machining properties. It is known commercially under such trade names as pascolin, tufuol, bakelite, etc., and is used extensively for the insulation of telephone switch-boards, terminal strips, etc.

THE COAL UTILISATION COUNCIL held a demonstration of road vehicles, propelled by some derivative of British coal, at Westminster on June 6-8. Collaborating in this demonstration were:—Sentinel Wagon Works, Ltd. (a smokeless, steam-driven lorry on pneumatic tyres); Gas Light, and Coke Co. (30 cwt. lorry which has run 20,000 miles on creosote without overhaul); National Gas Council (lorry running on compressed gas, lent by the Wandsworth Gas Co.); Chesterfield Tube Co. (manufacturers of cylinders for compressed gas); a municipal refuse collector converted to run on compressed gas and lent by the Chesterfield Corporation; Koela Producer Gas Plant Co., Ltd. (private car, lorry, and tractor all running on producer gas); Low Temperature Carbonisation, Ltd. (lorry running on heavy oil produced from coal by the low-temperature carbonisation process, and a private Rolls-Royce car and an oil-tanker driven on petrol produced from coal by the same process); Fuel Research Board (a vehicle running on petrol produced from hydrogenated tar); Whitwood Chemical Co. (lorry running on enriched coal gas).

MANCHESTER CITY COUNCIL is again offering a number of scholarships tenable in the Faculty of Technology of the University of Manchester. Successful candidates are required to follow a full-time course leading to the degree of Bachelor of Technical Science in the College of Technology. Candidates must have passed, or be exempt from passing, the Matriculation examination of the Joint Matriculation Board of the Northern Universities, and must also be qualified to enter upon a higher course. Candidates not qualified to enter upon a higher course will be eligible to apply for a Maintenance Allowance to enable them to take an ordinary course. In the event of there not being sufficient Manchester students available or suitably qualified for the scholarships, the committee may offer the scholarships to suitably qualified students resident outside the Manchester city area. Information may be obtained by written application to the Registrar of the College of Technology. Completed forms of application must be received on or before June 20.

THE SIXTH ANNUAL CONFERENCE of the National Smoke Abatement Society will be held this year in Glasgow. This will be the first time that the Society or its predecessors have met in Scotland, for the unbroken activities and influence of the Scottish branch have rendered any southern help quite unnecessary. The conference will, this year, be extended by one day, and will begin with a civic reception on September 27. The annual general meeting will be held on September 28, and will be followed by the first two sessions of the conference, one of which will be under the auspices of the Scottish branch, during the remainder of the morning and afternoon. A meeting on September 29 will be followed by a tour to the Trossachs or some other of Scotland's many places of scenic interest. The Scottish branch usually holds its own annual conference in May, but this year it is being postponed and combined with that of the National Society. Before the Glasgow conference there is to be the summer meeting in London, which will be a whole-day conference on smokeless open-grate fuels. It will take the form of a symposium in which eight speakers will read short introductory contributions on the different smokeless open-grate fuels and the important questions concerning them.